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ABSTRACT

The Georgia Prekindergarten Program was established in 1993 to provide the state's 4-year-olds with high-quality preschool experiences. A five-year, longitudinal study examined the ways in which differences in prekindergarten services received by 3,639 Pre-K 4-year-olds affected them during their first 3 years of elementary school and assessed the impact of the students' experiences in elementary school on educational outcomes. This report details findings from the fourth year of the study, as the 1996-97 Pre-K students ended Grade 3. Findings are presented in four sections: (1) students' outcomes during their third year in elementary school, including teachers' perceptions of readiness and ratings of students' academic performance, communication skills, and social behavior; (2) impact of prekindergarten and kindergarten characteristics and experiences, including teacher quality, teachers' beliefs and practices, and classroom disruptions on student outcomes through the end of third grade; (3) children's second-grade experiences, including teacher beliefs, practices, and instructional activities; and (4) parents' opinions and involvement in their child's education from prekindergarten through second grade. Among the study's major findings were that 82 percent of 1996-97 prekindergarten students were ready for their third grade, and during their third year of elementary school gained the most in math, science, and language arts. Students assigned to special instructional assistance fell further behind their peers. Older students significantly outperformed students who had turned four just prior to the cutoff for prekindergarten eligibility, with greater differences for those from economically disadvantaged backgrounds. Students attending prekindergarten classes with greater number of disruptive students fared worse through the second grade, especially in terms of classroom behavior. In the first few years of teaching, certified teachers were not as effective as noncertified degreed teachers or teachers with child development associate (CDA) credentials, but their effectiveness increased or remained constant

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over time, whereas the effectiveness of noncertified degreed or CDA-credentialed teachers declined. Students of teachers practicing child-centered instructional methods outperformed others during prekindergarten and kindergarten. The report's three appendices describe the sample and efforts to locate children during the study's fourth year, methods used to categorize teachers' instructional beliefs/practices and changes in teacher characteristics across the study period, and statistical methods used. (Contains 17 references.) (KB)

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Pre-K Longitudinal Study: Findings from the 1999-2000 School Year

Georgia State University

Applied Research Center

Andrew Young School of Policy Studies

April 2001

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Executive Summary
Pre-K Longitudinal Study:
Findings from the 1999-2000 School Year

In 1996, the Office of School Readiness commissioned a longitudinal study of the effectiveness of Georgia's Prekindergarten Program in preparing four year-olds for school and improving their educational success. This executive summary presents the major findings from the fourth year of the study conducted by the Applied Research Center at Georgia State University. The full report provides details of the findings and the methods used in the study.

Major Findings from the 1999-2000 School Year

As the 1996-97 Pre-K students ended their third year of formal schooling, 82 percent were ready for the third grade, according to their second-grade teachers. Over half (56.1 percent) were judged to be extraordinarily good to good in their preparation for third grade.

During their third year of elementary school, students gained the most in math, science, and language arts, ranking one, two and three in the composite score increases. Least change occurred in social behaviors overall, but attitude toward learning and independence increased significantly during the year. Children who had more highly developed skills when they began Pre-K and children with more educated parents achieved higher levels of skills by the end of the second grade.

A particular concern arose with respect to the students who were assigned to Special Instructional Assistance, an intervention program for students who were judged to need remedial assistance. Students who received Special Instructional Assistance (SIA) fell further behind their peers, indicating that those services were not effective in reducing the academic disparities between students. This program was recently replaced in the educational reforms passed by the legislature in 2000 with a program to reduce class sizes for students who fall behind their peers.

Older students significantly out-performed the students who turned four in June, July or August of their Pre-K year, just prior to the September 1 cut-off for Pre-K eligibility. Students who were barely four when entering Pre-K scored about 10 percent behind their peers in math in 2000, for example. These differences were greater for those from economically disadvantaged backgrounds. These results suggest that it may be reasonable to consider granting waivers to parents of children who were born after May if the parents wish to delay receipt of Pre-K services until the following year.

Children who attended Pre-K in classes with greater number of disruptive students fared worse through the second grade, especially in terms of their behavior in the classroom.

The effectiveness of Pre-K teachers who held Child Development Associate (CDA) credentials declined as their years of experience increased. The effectiveness of teachers with college degrees, but who were not certified, also declined with more experience, but not as severely as those with CDA credentials. In their first few years of teaching, certified teachers were not as effective as the others, on average, but their effectiveness increased or remained constant as they gained experience. The effects of certified teachers were the greatest in Pre-K classes with high concentrations of disadvantaged students.

Overall, students of teachers who believed in and practiced child-centered methods of instruction out-performed others during Pre-K and kindergarten. Child-centered instructors were significantly more effective in classes with more disadvantaged students, a positive effect that persisted through the students' fourth year in the study. Teachers who taught these students during 1999-2000 were much more directive in their approaches than Pre-K and kindergarten teachers, but not much different from last year's teachers.

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These findings are based on a sample of 3639 children who participated in Pre-K during 1996-1997 and who, for the most part (90 percent), were in regular second-grade classes during 1999-2000. The findings are drawn from analyses of teachers' ratings of their students' skills and abilities as well as teacher and parent surveys. While it is reasonable to use these findings to inform program improvement efforts and discussions about education policy in the early elementary years, findings in later years, when standardized test scores are available, may be different.

For a copy of the full report of the children's 1999-2000 school year, see the Applied Research Center Website: http://www.arc.gsu.edu

Prekindergarten Longitudinal Study:
Findings from the 1999-2000 School Year
Fourth Report in a Series

Introduction to the Prekindergarten Longitudinal Study

The Georgia Prekindergarten Program was established in 1993 to provide Georgia's four-year-old children with high quality preschool experiences. This educational initiative, funded by the Georgia Lottery for Education, currently serves approximately 62,500 children each year. The goal for every Georgia Prekindergarten (Pre-K) Program classroom is to provide young children with the learning experiences they need in order to be ready for kindergarten and to enhance their cognitive and social development during their early elementary school years.

The main purpose of this study is to examine the ways in which differences in Pre-K services received by four year-olds affect them during their early elementary school years. In addition, the study assesses the impacts of the students' experiences in elementary school on their educational outcomes. In this year's report, the effects of differences in teacher quality, as measured by credentials and years of experience, teachers' beliefs and practices, and the impacts of disruptive children in Pre-K classes are analyzed in relation to the students' social behaviors and communication skills as well as math, science, and reading skills. The report also summarizes the children's promotions and participation in special programs, some characteristics of their teachers, and their parents' opinions about the children's education. Findings presented in this year's report can inform efforts to improve the effectiveness of Pre-K services and raise issues for consideration by elementary grade teachers as well as Pre-K and elementary school administrators across Georgia.

The Applied Research Center at Georgia State University has completed the fourth year of a longitudinal study of the Georgia Pre-K program and this report documents the methods and findings for the children's first three years in elementary school. The evaluation, which is being funded by the Office of School Readiness (OSR), is designed to follow a probability sample of Pre-K children through their elementary school years. In addition, the study should contribute to our understanding of how young children develop and benefit from various educational experiences.

The report of the fourth year of the study is organized into four sections:

1. a description of the students' outcomes during their third year in elementary school, including their teachers' perceptions of readiness and ratings of the students' academic performance, communication skills, and social behaviors;
2. an assessment of the impact of Pre-K and kindergarten characteristics and experiences, including teacher quality, teachers' beliefs and practices, and classroom disruptions on student outcomes through the end of second grade;
3. a report on the children's second grade experiences, including teacher beliefs, practices and instructional activities; and
4. a description of parents' opinions and involvement in their child's education from Pre-K through second grade.

Results from the study are presented in the four sections that follow this introduction. In addition, three appendices describe: the sample for the study and the results of efforts to locate the children during the study's fourth year; the methods used to categorize teachers' instructional beliefs and practices and changes in teacher characteristics across the study period; and the statistical analysis methods used in this year's report. Results from the first three years of the evaluation are available by accessing the Applied Research Center's web page at *www.arc.gsu.edu*.

1. Student Outcomes in the Fourth Year of the Study

This report contains findings from the fourth year of a longitudinal study of Georgia's Pre-K participants. The majority of children who were enrolled in Pre-K during 1996-97 were enrolled in second-grade classes for the 1999-2000 school year. Outcome data were collected from the classroom teachers for each of the students who could be located in Georgia, including teacher assessments of specific knowledge and skills of each student at the beginning and end of the school year, assignments to special programs, and promotion recommendations. Throughout the 1999-2000 school year we located 2,982 students in 1,977 classrooms. In the fall of 1999, we received beginning-of-year teacher assessments for 2,580 children from 1,694 teachers. In April 2000, we mailed end-of-year assessments for each student and teacher surveys. After we made several attempts, encouraging teachers to respond, 1,586 teachers provided end-of-school year (May-June) ratings on a total of 2,407 children.

Data collection efforts for the fourth year of the evaluation began by attempting to locate the 3,639 children from the original Pre-K sample of 203 classrooms. For a detailed description of the location process, see the Sampling and Tracking section in Appendix A. In their Pre-K year, the children in the original sample were provided educational services in 203 classrooms. The number of classrooms expanded to 1,657 in the kindergarten year and 1,847 classes in the first-grade year. The total number of 2,982 children located in the fourth year includes any child who was confirmed in a classroom within the state of Georgia during the 1999-2000 school year. This number has fluctuated throughout the project year as children moved out of the state or transferred to other schools within the state. In addition, there are an unknown number of children who may be home schooled and are no longer traceable through the school systems.

Table 1 displays the types of schools (public and private) that the children in our sample attended in their Pre-K year and subsequent years. In the first section of Table 1, children in our sample are shown based upon the type of Pre-K they attended. For example, 41 percent of the children attended a Pre-K within a local school system during the 1996-97 year and 59 percent attended a private Pre-K (includes private for-profit, private not-for-profit, and other non-public schools). For the current year of the study, 44 percent of the sample was the children who had attended Pre-K within a local school system, while 56 percent of the sample in the current year attended a private Pre-K. The second section of the table details the way the type of school (public and private) changed after the Pre-K year for most of the children in our sample. Whereas, 59 percent attended a private Pre-K, only 2 percent of the children we located in subsequent years attended a private elementary school.

Both tables indicate there are not many changes between the kindergarten year and the second-grade year in terms of the percentage of children by type of school they attended. As in the previous two years, the majority of second-grade children were enrolled in public schools. For the original sample, we have included in the private school category those schools that are not affiliated with a public or local school system. These schools include church-based programs, military or college-based programs as well as for-profit and not-for-profit organizations such as Head Start. More detailed demographic comparisons (region, race and sex) between the original sample and current sample can be found in Appendix A.

Table 1. Type of School Organization of Children In First Four Years of Sample

Based On Pre-K Services Received	96-97 Children		97-98 Children		98-99 Children		99-00 Children	
	N	%	N	%	N	%	N	%
Local School System	1498	41	1403	45	1337	44	1326	44
Private School*	2141	59	1684	55	1681	56	1656	56
Total	**3639**		**3087**		**3018**		**2982**	
Based On Educational Placement Each Year	**96-97 Children**		**97-98 Children**		**98-99 Children**		**99-00 Children**	
	N	%	N	%	N	%	N	%
Local School System	1498	41	3041	98	2949	98	2924	98
Private School*	2141	59	77	02	69	02	58	02
Total	**3639**		**3087**		**3018**		**2982**	

**Private Schools include private for-profit, private not-for-profit, and other non-public schools*

As in the previous years, teachers received forms requesting assessments of each student in skill areas based predominantly on the Georgia Quality Core Curriculum (QCC). Teachers were asked to rate each of the students in the study from 1 (extraordinarily poor) to 7 (extraordinarily good) for each of 24 skill areas. The assessments for the second grade covered math, language arts, and science as well as social behaviors and communication skills. Each academic skill area included a performance statement, extracted from the QCC, on which teachers could base their ratings. In addition, teachers were asked to indicate the degree to which parents were involved in their children's schooling, whether the student qualified for Special Instructional Assistance (SIA), whether the student received a Student Support Team (SST) referral, next year placement recommendations, and extraordinary events that might affect the child's progress.

The sample for which outcome information was collected contains slightly more males than females. Most of the children for whom we received data are white (53 percent), followed by black children who make up 38 percent of the sample. Approximately 4 percent of the children are from a Hispanic background. Asian and multiracial children each represent 3 percent of the sample. In subsequent analyses, we report findings for whites, blacks, and other minorities, since we have too few children of Hispanic, Asian, or multiracial origin to analyze their outcomes separately.

Although most children in the sample in the 1999-2000 school year were in the second grade, retention and special program assignments did occur. Table 2a shows that 90 percent of the children had progressed to the second grade, indicating that they have stayed on grade level. Nine percent of the children had been held back one year and were in the first grade during 1999-2000. A few students, under 0.5 percent, were advanced ahead of schedule to third grade.

Table 2a. Placement of Students in the Fourth Year of the Study

	Frequency	Percent
Second Grade	2051	90.4
First Grade	206	9.1
Kindergarten	4	0.2
Promoted to Third Grade	7	0.3
Subtotal	2268	100.0
Missing	1371	
Total	3639	

Table 2b. Placement Recommendations for the Fifth Year of the Study

	Frequency	Percent
Third Grade (regular classsrooms)	2043	86.7
Second Grade or First Grade	221	9.4
Special Education and Other	93	3.9
Subtotal	2357	100.0
Missing	1282	
Total	3639	

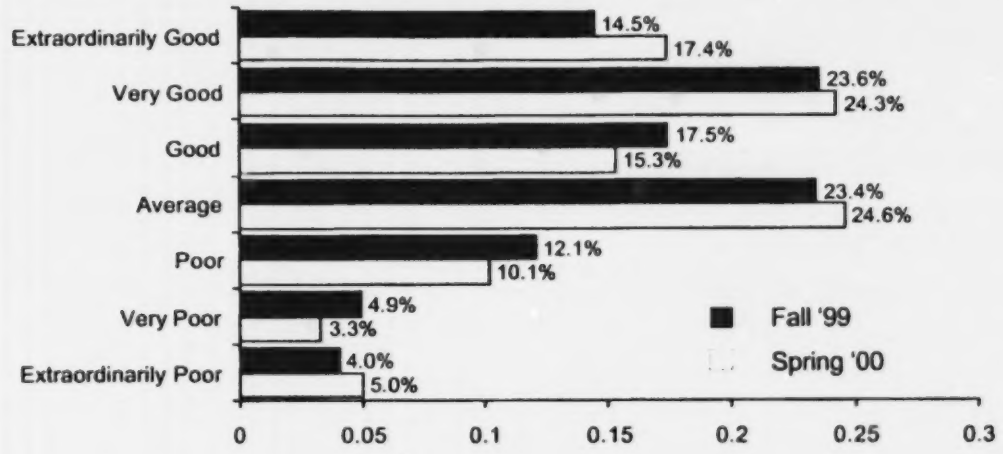
At the end of the school year, second-grade teachers made grade placement recommendations for the following year in patterns similar to first-grade teacher recommendations. As noted in Table 2b, 86.7 percent of second graders were recommended to proceed to regular third-grade classrooms, which is down from the 88 percent recommended to proceed to second grade from first grade. The number of children who were not expected to stay with their age cohort was about the same as last year, about nine percent, and almost four percent were expected to be in programs for children with special needs. Children in special education programs or in other categories remained relatively constant from one year to the next. Approximately one-sixth of the children recommended for promotion to 3rd grade qualified for special instruction assistance (SIA) versus about two-fifths of the children retained during 1999-200 in the first grade or kindergarten.

For the findings reported in the remainder of this report, sample sizes will vary based on the completed information we received from teachers and parents. Unless otherwise noted, all findings are reported for the entire sample regardless of whether they had progressed on time into a second-grade classroom. In other words, the outcomes are reported for students who have progressed into the second grade as expected, as well as those who were held back or received special assignments. This allows the most complete and accurate assessment of the progress of the children in Pre-K during 1996-1997.

Readiness for Second Grade

Figure 1 depicts teachers' ratings of the children's readiness for second grade at the beginning of the second-grade school year. Over three-quarters of the former Pre-K participants were rated as average or better (79 percent) on second-grade readiness. More children were rated very good or average in terms of readiness than for any other single rating (23.6 and 23.4 percent, respectively). More than half of the children (55.6 percent) received ratings of good to extraordinarily good. A substantial number of children (21 percent) received low ratings on readiness for second grade. These categories include extraordinarily poor (4.0 percent), very poor (4.9 percent), and poor (12.1 percent). The mean score on readiness for second grade was 4.8 percent, meaning that, on average, children's readiness was rated above average.

Figure 1. Readiness for Second Grade (Fall 1999) and Third Grade (Spring 2000)



Readiness for Third Grade

By the end of second grade (Figure 1), teachers rated the readiness of the Pre-K participants for third grade, on average, to be 4.9 percent, slightly but statistically higher than their beginning-of-year ratings for second grade (Table 3). This would indicate that teachers generally considered the development of the children to have occurred as expected. Teachers judged the readiness of 57 percent of the children in the study to be good to extraordinarily good at the end of the school year. Combining extraordinarily good, very good, good and average categories, teachers indicated that approximately 82 percent of the Pre-K participants were reasonably on track for the third grade. About eight percent were considered either very or extraordinarily unprepared for third grade and about ten percent were "on the bubble" with respect to progressing to the third grade on time. Most of the students rated as very poor or extraordinarily poor were recommended for placements in special education or below the grade level for their ages.

Teacher Ratings of Skills and Abilities

As mentioned above, teachers were asked to rate the children on 24 skills and abilities that were relevant to second graders. The academic ability criteria were derived predominantly from the Georgia Quality Core Curriculum Guide established by the state as an appropriate curriculum for the children at each grade level. Other items were based on behavioral items used in earlier years to assess communication skills and social behaviors. Ratings on the children were collected both at the beginning of the school year (September) and at the end of the school year (April/May).

The 24 skill areas on the second-grade-year ratings reflect a small increase over the number of skill areas assessed during the previous years. A few items were changed to reflect that the children were older, incorporating social skills expected of second graders and an increased focus on academic subjects, this year covering language arts, math and science.

Teachers assessed each student in the study in terms of their skills and behaviors related to:

1. Coping with Conflict
2. Making Conversation
3. Positive Attitude towards Others
4. Asserting Independence
5. Ethical Behavior
6. Positive Expression
7. Refusal Skills

8. Attitude Toward Learning
9. Respect for Authority
10. Writing
11. Grammar Usage
12. Listening
13. Speaking
14. Reading
15. Measurement
16. Problem Solving
17. Addition and Subtraction
18. Patterns and Relationships
19. Shapes
20. Science Concepts
21. Science Process and Inquiry Skills
22. Overall Language Arts
23. Overall Math
24. School Readiness

A summary key was included with the rating forms both at the beginning of the year and at the end of the year. The key defined and described each skill area. Specific examples of the skill areas were provided to give teachers a clearer picture of the skill they were expected to rate. For example, the summary key describes "addition and subtraction" as "Adds and subtracts 3-digit numbers; counts money and makes change; uses strategies to solve basic addition and subtraction problems," and a few more statements reflecting the state's expected level of proficiency for second graders (QCC). Copies of the summary key are available from the authors.

Changes in Ratings from Fall 1999 to Spring 2000

For all 24 skill and behavioral ratings, the average ratings for fall 1999 and spring 2000 are presented in Table 3. The largest gains occurred in math and science with language arts also showing meaningful and significant gains. Measurement, addition and subtraction and shapes all increased about .46 point during the year. Science concepts grew at a .43-point rate. Many of the gains are smaller than in previous years and especially modest gains (or even statistically insignificant declines) were registered in some of the social behaviors and communication skills. However, in two very important categories of social behaviors, attitude toward learning and asserting independence students posted statistically significant gains. Coping with conflict, ethical behavior, and positive attitudes attained insignificant differences over the course of the year. Respect for authority significantly deteriorated from the beginning of the year to the end.

Table 3. Average Fall and Spring Student Ratings in the 2nd Grade

	Fall Rating	Spring Rating	Change	|t-score|	df	p <
Cope with Conflict	4.698	4.671	-0.027	0.998	2126	Ns
Make Conversation	4.994	5.099	0.104	4.021	2139	0.000
Positive Attitude	4.932	4.977	0.045	1.739	2127	ns
Asserting Independence	4.753	4.850	0.096	3.635	2138	0.000
Ethical Behavior	5.083	5.123	0.041	1.476	2138	Ns
Positive Expression	5.013	5.096	0.083	3.216	2135	0.001
Refusal Skills	4.621	4.702	0.081	3.155	2136	0.002
Attitude Toward Learning	5.089	5.173	0.083	3.434	2042	0.001
Respect for Authority	5.503	5.444	-0.059	2.322	2134	0.020
Writing	4.828	5.004	0.175	7.215	2127	0.000
Grammar Usage	4.656	4.841	0.185	8.124	2132	0.000
Listening	4.786	4.969	0.184	7.569	2129	0.000
Speaking	4.837	5.018	0.180	7.820	2133	0.000
Reading	4.640	4.938	0.298	13.269	2135	0.000
Measurement	4.488	4.925	0.437	19.052	2019	0.000
Problem Solving	4.493	4.784	0.291	12.648	2117	0.000
Addition and Subtraction	4.427	4.956	0.529	20.811	2031	0.000
Patterns and Relationships	4.942	5.259	0.318	13.774	2118	0.000
Shapes	4.961	5.420	0.459	18.870	2073	0.000
Science Concepts	4.606	5.032	0.426	18.137	2055	0.000
Science Process and Inquiry Skills	4.543	4.861	0.317	14.191	2030	0.000
Overall Language Arts	4.454	4.753	0.300	13.955	2122	0.000
Overall Math	4.599	4.837	0.238	10.377	2124	0.000
Readiness	4.820	4.893	0.072	3.364	2104	0.001

*Note: Responses ranged from 1 to 7, where 1 = extraordinarily poor, 2 = very poor, 3 = poor, 4 = average, 5 = good, 6 = very good, 7 = extraordinarily good. An * indicates the differences are statistically significant (p < .05).*

Analysis of Behavior and Skill Ratings

For analytical purposes, the skill items for each year of the four years of the study were combined into four assessment areas: Social Behaviors, Communication Skills, Language Arts, and Mathematics. Readiness was assessed each year beginning with kindergarten and is included as a separate assessment. For the first and second grade, science skills were assessed and analyzed for this report. The individual ratings for each year were included in the combined scores using a technique referred to as confirmatory factor analysis (See Appendix C for details). Table 4 lists the skill ratings represented in the combined ratings for the second-grade year. In all subsequent analyses that refer to the constructs listed above, we are using the confirmatory factors that combine the skill ratings listed in Table 4.

Table 4. Items Comprising Five Dimensions Assessed for the 2nd Grade Assessments

Combined Ratings	Skills Included in Combined Ratings	
Communication Skills	Making conversation Listening	Speaking skills Expressing feelings
Social Behaviors	Respect for authority Refusal skills Coping with conflict	Ethical behavior Positive attitude toward others
Language Arts Skills	Grammar Writing Listening	Vocabulary usage Speaking skills Overall language arts
Mathematics Skills	Addition and subtraction Problem solving Patterns	Measurement Shapes Overall math
Science	Science concepts	Science process and inquiry skills

Table 5 shows the mean change in each of the five constructs from the beginning to the end-of-the-year ratings across all four years. During the second grade, the former Pre-K participants increased their scores in all skills from the beginning of the year to the end of the year, except for social behaviors. The rate of growth has tapered off, possibly due to the increasing breadth and depth of the curriculum and, in part, to the rate of development for seven year-olds. During the Pre-K year, social behaviors and communication skills improved by just under 1 point each. Slightly larger increases in math scores, about 1 point, were registered. Language arts skills increased by a smaller amount, approximately .80 point. Turning to the kindergarten year, all academic and social ratings increased during the year by substantially smaller amounts. Both language arts and math ratings showed larger gains during the kindergarten year, increasing at just under .5 point through the year. Social behavior ratings, such as social behavioral outcomes, slowed in terms of the rate of growth, increasing just .15 point. Communication skills increased about .25 point over the course of kindergarten. During the first grade, over the school year, fall to spring changes spiked up from the lower levels seen in the kindergarten year. Math skills increased by about .9 point, language arts increased by about .7 point, and science, a new skill area added to the study that year, by .7 point. Behavioral ratings increased by about .2 point from the fall to spring rating, while communications ratings increased more substantially, by .4 point.

In the second grade, over the course of the year, growth rates continued to be significant, especially in academics. The students' academic assessments showed the greatest growth, with language arts ratings increasing .2 point over the course of the year, while math and science ratings grew at about .4 point each. Teachers assessed the social behaviors of the children virtually the same at the beginning of the year as at the end of the year. Communications ratings grew only .14 point. Because the children were a year older, development of social skills and communications skills were likely to be less rapid. All of the gains, except for social behaviors, are statistically significant.

In the fall, teachers assess students' readiness for their current grade, while the spring rating asks teachers to rate students on readiness for the subsequent grade. Therefore, one would expect little change in the ratings as the criteria change, unless many students experienced accelerated progress during the year. During the kindergarten year, the readiness rating increased by about .18 point. Over the course of the first-grade year, readiness grew by almost .5 point. Readiness ratings increased slightly but significantly from the beginning to the end of the students' third year in elementary school.

Table 5. Mean Gains for Students in Constructs Across Years

	Change	|t-score|	N	p<
Social Behaviors				
Prekindergarten	0.856	38.848	2257	0.000
Kindergarten	0.146	7.047	1566	0.000
1st Grade	0.216	8.302	1182	0.000
2nd Grade	0.005	0.268	2084	0.789
Communication Skills				
Prekindergarten	0.992	39.959	2260	0.000
Kindergarten	0.238	9.550	1565	0.000
1st Grade	0.402	14.761	1184	0.000
2nd Grade	0.141	7.626	2081	0.000
Math				
Prekindergarten	0.972	33.276	2234	0.000
Kindergarten	0.450	15.683	1564	0.000
1st Grade	0.892	25.097	1184	0.000
2nd Grade	0.369	19.738	2003	0.000
Language Arts				
Prekindergarten	0.778	25.496	2236	0.000
Kindergarten	0.473	16.004	1557	0.000
1st Grade	0.670	22.332	1184	0.000
2nd Grade	0.221	12.625	2075	0.000
Readiness				
Kindergarten	0.178	6.433	1542	0.000
1st Grade	0.461	12.974	1165	0.000
2nd Grade	0.065	2.940	2048	0.003
Science				
1st Grade	0.674	18.114	1157	0.000
2nd Grade	0.366	17.328	2042	0.000

* *The readiness question was not asked in the fall rating for the Pre-K year and science assessment was not included until the first-grade year.*

*Note: Responses ranged from 1 to 7, where 1 = extraordinarily poor, 2 = very poor, 3 = poor, 4 = average, 5 = good, 6 = very good, 7 = extraordinarily good. An * indicates the differences are statistically significant (p < .05).*

Comparing the Ratings for Groups of Students

As the next step, we estimated the behavioral and academic skills averages for sub-groups of children at the end of their third year in elementary school, as presented in Table 6. These differences do not control for or factor in any other differences, so they should not be construed as being caused by membership in the particular sub-group. However, differences between sub-groups may be illuminating.

Table 6. Mean Scores on Academic Skill Ratings by Characteristics of the Children and Their Families.

	%	Social Behaviors	Communication Skills	Language Arts	Math	Readiness	Science
Sex							
Female	51	4.65	4.74	4.58	4.90	4.59	4.81
Male	49	5.21	5.26	5.15	5.09	5.08	5.01
Region							
North GA	14	4.93	4.98	4.79	4.91	4.78	4.86
Metro Atlanta	48	5.01	5.04	4.91	5.09	4.91	5.02
Southwest	15	4.82	4.90	4.79	4.84	4.71	4.73
Southeast	14	4.79	4.97	4.85	4.95	4.83	4.80
South	9	4.94	5.02	4.86	4.94	4.75	4.87
SIA							
Participates	17	4.39	4.25	3.84	4.09	3.59	4.01
Not Participate	69	5.09	5.24	5.18	5.26	5.21	5.16
School Not Enrolled	14	4.84	4.76	4.62	4.82	4.56	4.80
Marital Status							
Not Married	29	4.59	4.79	4.70	4.80	4.66	4.66
Married	71	5.17	5.20	5.06	5.19	5.08	5.11
Education							
High School or Less	39	4.69	4.72	4.52	4.68	4.50	4.56
Some College	41	5.09	5.19	5.07	5.14	5.05	5.05
College Degree	20	5.36	5.49	5.52	5.59	5.58	5.58
Income							
Less than 30k	38	4.72	4.74	4.57	4.70	4.55	4.58
31-50k	33	5.09	5.16	5.03	5.17	5.03	5.03
More than 50k	29	5.27	5.43	5.38	5.43	5.38	5.42
Category 1							
Non Category 1	48	5.21	5.29	5.19	5.31	5.20	5.24
Category 1	52	4.65	4.73	4.59	4.70	4.61	4.61
Promotion Recommendations							
Promoted to 3rd Grade	85	5.05	5.18	5.12	5.20	5.19	5.14
Retained in 2nd Grade	9	4.35	4.18	3.69	4.04	2.81	3.70
Other	6	3.94	3.36	2.66	3.08	2.38	3.12
Disruptive Children							
Non-Disruptive Child	84	5.14	5.16	5.12	5.04	5.05	5.04
Disruptive Children	16	3.99	4.29	4.37	4.06	3.85	4.21
Race							
White	53	5.04	5.17	5.03	5.18	4.99	5.09
Black	38	4.65	4.73	4.61	4.69	4.55	4.59
Other	9	5.49	5.15	5.05	5.22	5.14	5.22
Age							
Youngest 1/3	35	4.87	4.88	4.73	4.85	4.66	4.76
Middle 1/3	33	4.93	4.99	4.86	4.99	4.83	4.91
Oldest 1/3	32	4.98	5.12	5.03	5.15	5.07	5.06
Teacher with Advanced Degree							
No	49	4.93	5.02	4.88	5.00	4.85	4.93
Yes	51	4.92	4.99	4.87	4.98	4.83	4.90
Teacher's Certification							
Early Childhood Education	55	4.90	4.99	4.87	4.98	4.82	4.90
Elementary Education	21	4.92	5.03	4.96	5.09	4.92	5.03
Both	22	5.03	5.08	4.89	5.01	4.89	4.92
Other	2	4.41	4.12	3.71	4.09	3.76	3.98

In both language arts and math, girls scored higher than boys in second grade. On average, girls scored .57 point higher than boys in second-grade language arts but .19 point higher in math. The differences in second-grade science ratings were similar to the differences in the math ratings. Girls outperformed boys by .20 point. Teachers rated girls' social behaviors significantly higher, about .56 point in the second grade. Similarly, the girls' communication skills were about .32 point higher in Pre-K and the

differential increased to about .52 point by the second grade. Girls continue to be judged more ready for the next grade than boys, on average.

To examine the effect of age, we separated the children into thirds, based on their ages at entry into the Pre-K program. During the Pre-K year, older children performed significantly better than the youngest students and the ratings increased with the age of the child. However, by second grade, the ratings for the middle 1/3 only slightly exceeded the youngest students, approximately .14 point higher in math, language arts and science. By the end of the second grade, the oldest 1/3 outperformed the youngest 1/3 by .30 point in all three subjects. There was little difference in social behaviors between the middle and youngest age children. While the communication skills were significantly higher in the Pre-K year (.19), the scores were about the same level by second grade. The oldest children scored significantly higher on social behaviors (.18) and communication skills (.29) in the Pre-K year. Their scores remained higher than the other groups at the end of the second grade. Older children were more ready in the second-grade year, scoring .15 point and .41 point higher than middle and younger age children, respectively. These differences, especially for the youngest children, became more pronounced when we controlled for differences in family background and skill levels when entering Pre-K as presented in Section 2.

Special Instructional Assistance was a program designed to bring the achievement of students who had fallen behind academically up to the level expected for their age. We compared individuals who received Special Instructional Assistance (SIA) in the second grade to those who did not receive SIA and those who were in schools that did not participate in the SIA program. Not surprisingly, students who were in schools that did not participate in SIA had ratings that closely resembled a mix of both SIA and non-SIA students. The language arts ratings of the non-SIA students increased to a spread of 1.34 points above the SIA students. Since the Pre-K year, the spread between SIA and non-SIA students on language arts has increased by approximately .7 point. Similarly, the math scores increased to a 1.2-point differential in the second grade, .35 point greater than the Pre-K year.

Children who did not participate in SIA scored significantly higher on social behaviors and communication skills, and the differentials only increased over time. Those who did not participate were rated .4 point higher on social behaviors and .5 point higher on the communication skills rating during their Pre-K year. These differences increased by the second grade to 1 point on social behaviors and .33 point on the communication skills. Children who participated in SIA in the second grade were rated far lower on the readiness scale in the Pre-K year (-.85) and the differential became much wider by the second-grade year (-1.62). Clearly, this indicates that the gap between SIA students and their peers in the same schools increased as they progressed through school. This program was eliminated in the state's education reform legislation and replaced by a program to reduce class size for struggling students.

We compared individuals based on a number of family and demographic characteristics. Consistent with a voluminous amount of research on educational achievement, this study finds that children whose parents are more educated, as measured by the education level of the most educated parent, attain higher levels of academic skills than children of less educated parents by the end of the second grade. Children whose parents have some college education rated about .5 point higher in math scores than those whose parents have a high school diploma or less. The language arts rating for this group is .55 point higher by the second grade. Children with parents who have a college degree have ratings that are .67 point higher than parents with a high school or lower education in the Pre-K year, one point on the language arts rating and about .90 point on the math rating by the second grade.

Those children whose parents attended some college received higher ratings in the Pre-K year and increased the differential by the second grade over those children whose parents had a high school diploma or less. Their social behaviors increased from .15 point higher to .4 point higher, while their communication skills increased from .28 point higher to .47 point higher. While children whose parents have a college degree or better had significantly higher ratings on the social behaviors (.25 points) and

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communication skills (.33 point), this differential increased significantly by the second grade to about .7-point differential on both rating scales.

There are similar, but somewhat less substantial differences posted by children from families with a greater income. Children from families that earn between $30,000 and $50,000 per year consistently received about .40 point higher on all ratings than children from families that make less than $30,000 per year. Children from families that earn more than $50,000 per year were assessed at just under .50 point higher than the lowest income group in the Pre-K year. This difference increases to a .75 point differential by the second-grade year. Children identified as Category One during Pre-K, another distinction based on income, in this case the eligibility of the child's family for means-tested government programs, showed similar patterns. Children not in Category One had ratings that are higher than Category One children by similar differences to those between higher income groups and the lowest income group. Similar to the academic ratings, the differences in readiness based on income were far less dramatic than the differences based on education.

Relatively small differences between the ratings based on the income were registered for social behaviors and communication skills during the Pre-K year. However, differences did emerge for both social behaviors and communication skills by the second-grade year. Children from middle income families were rated .4 point higher on both scales when compared to the lowest income groups, while the top income groups received ratings about .75 point higher. The same type of change occurred when comparing children classified as Category One and those who were not. Children not in Category One received ratings about .2 point higher on both scales during the Pre-K year, increasing to a differential of .6 point on both scales by the second grade.

By the end of the second grade, children of married parents who consistently lived together with the child outperformed their peers who lived in single parent households. The language arts and math scores for children of married parents were about .50 point higher by the end of the second-grade year. Children with married parents received significantly higher scores on both social behaviors (.24) and communication skills (.12) in the Pre-K year. These differences sharply increased by the second-grade year to .58 point in social behaviors and .41 point in communication skills. However, when controlling for other factors, as shown in Section 2, these differences are only significant for social behaviors.

To study the impacts of classroom disruptions in Pre-K on the academic and social development of children, we tracked children that we identified as being disruptive in Pre-K. On average, Pre-K teachers had 3 disruptive children in their classes in 1996-97. However, nine percent of those teachers had one or fewer disruptive students in their classes, while 16 percent had five or more disruptive children. The identification of disruptive children was made based on each Pre-K teacher's indication of the number of disruptive students in his/her class. We then ranked the individual students based on the behavioral scores provided by the teachers and designated the number of children with the lowest ratings equal to the number of disruptive children as disruptive. In the second grade, the Language Arts ratings were over one point lower and Math ratings about .90 point lower for the disruptive children when compared to the non-disruptive children. This suggests a strong connection between early behavioral problems and later academic performance, a finding that is reinforced by a plethora of other research.

Children identified as disruptive in the Pre-K year decreased the spread in social ratings by the second grade. Since these children were identified based on their low behavioral ratings in the Pre-K year, it is not surprising that they were rated far lower than their non-disruptive counterparts -- 1.86 points lower. However, by the second-grade year, the disruptive children had made up about .7 point in the difference between the two groups, to a differential of 1.15 points. Similarly, though not as dramatic, non-disruptive children were rated higher in the communication skills in the Pre-K year (1.12 points), but the difference fell to an 87-point differential by the second grade. Disruptive children received far lower readiness ratings than the other children (1.3 points) in the Pre-K year and improved insignificantly by the second-grade year (1.2 points).

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We looked at ratings alongside the promotion recommendations of the teacher at the end of second grade in the fourth year of the study. This permits us to look back and see what differences existed among those who are progressing as expected versus those who were either recommended to be promoted to or retained in the second grade. There are also students who fall into an "other" category, mainly special education programs. Not surprisingly, the fourth year results indicate that the students who are or have been recommended to be retained at least one year scored over 1 point lower in math and about 1.5 points lower in language arts and science. The differential in the math ratings is about the same as it was in the Pre-K year, though the language arts spread from the Pre-K year did increase. Students in the "other" category were rated about one point lower in language arts and math ratings in the Pre-K year, but that difference increased substantially by the second-grade year. In the spring surveys, the differential in the language arts ratings increased to 2.5 points while the math spread increased to almost a 2.25-point differential.

Children who were recommended either to remain in second grade or be promoted to second grade received far lower social behaviors and communications ratings in both years. The differentials were .7 point on the behavioral rating and one point on the communications rating. Children recommended for special education or other programs received ratings that were about .6 to .7 point lower in the Pre-K year, and that increased to a 1.11 point-differential on the second-grade behavioral rating and a 1.82 point-differential on the communications scale. Those children who could expect to be promoted to or retained in second grade had readiness scores far lower (2.4 points) than the children who were recommended to proceed to the third grade on schedule. These children received ratings one point lower in the Pre-K year. Those children in special education programs received ratings of 1.2 points lower than "normally" progressing children in the Pre-K year and 2.8 points lower in the second-grade year.

To account for teacher characteristics that may relate to quality, we estimated differences in outcomes by whether the teacher had an advanced degree and the type of certification the teacher held. There was virtually no difference in the ratings between teachers who had advanced degrees and those who did not. Similarly, whether a teacher held either or both the elementary education certification and the early childhood education certification made no difference on academic outcomes. The teachers with certificates other than those just mentioned taught students who were rated lower on academic skills. However, this is primarily because the other certified teachers included those with special education certificates who are likely to be teaching children identified as having special needs.

Regarding social behaviors and communication skills, there was virtually no difference between the students of degreed and non-degreed teachers, or based on certification. This was true except for those with special education certificates, where the ratings were significantly lower, most likely as a result of teaching students in special education programs. Once again, teacher quality, other than teachers with special education certificates, did not differentiate readiness. However, we need to caution that this analysis did not attempt to assess the effectiveness of these different groups of teachers. In the next section, we begin to assess the influence of various differences of experiences in Pre-K and kindergarten on student outcomes in the second grade.

2. Impacts of Pre-K and Kindergarten on Second-Grade Performance

For this report, we analyzed the extent to which differences in Pre-K and kindergarten experiences influence children's performance at the end of their third year of elementary school. We focused on several potential influences that have been raised as important program and policy concerns, including the credentials and experience of teachers, the teachers' beliefs and practices about their instructional approach, and the number of disruptive students in the class. In addition, the influence of transitioning from Pre-K to kindergarten within the same school was analyzed for this report. We will single out the age of the child for special attention, since age restrictions on eligibility are established by policy and may be adjusted, if needed, to maximize program benefits.

All of these potential influences were assessed for this section controlling for characteristics of the children and their families, such as race, gender, ratings of the students' skills and abilities when they entered Pre-K in 1996, as well as parents' education, income and marital status. The outcomes analyzed include language arts performance, math performance, science performance, readiness for third grade, communication skills, and social behaviors, all assessed at the end of their third year of elementary school, for most, the second grade. The technical details of the analysis are presented in Appendix C. In order to probe more deeply the influences on children with fewer advantages, we conducted an additional analysis of these effects in classrooms having children with fewer economic advantages. Where those results differ from the findings for all classes of Pre-K children, we note the differences in the text. The tables displaying the full results for these classes are found in Appendix C.

Summary of Influences on Second-Grade Skills and Behaviors

In this section, we summarize the influence of differences in the Pre-K and kindergarten experiences of Georgia's children on their performance through the end of their third year of elementary education. While the analysis does present important systematic differences, other research has shown that some types of differences, specifically cognitive gains, can fade out over time and others, such as improved educational and social outcomes, may appear. For example, it appears that the effects of household income differences are becoming more significant over time. We believe that is very important to analyze the results of promotion decisions and standardized test scores that will be available as these children complete the third grade. Our emphasis in this report is on the Pre-K differences that are systematically related to fourth year performance and differences in kindergarten that may enhance or reduce any gains achieved during Pre-K.

The age at which a child begins Pre-K strongly influences his/her academic and other skills from Pre-K through second grade. Children at the older range of eligibility for Pre-K score approximately 10 percent higher on all academic subjects than children who turn four just as they begin Pre-K, that is, in June, July or August immediately prior to beginning Pre-K. For children in classes with more disadvantaged students, age has an impact approximately twice as large or 20 percent higher for the September births than the June through August births.

Children who were in classes with more disruptive children fare worse in all skills and behaviors except math. On average, children in classes with four disruptive children score 20 percent lower on academic performance measures than children in classes with no disruptive children. Most of these negative impacts accrue to the disruptive children themselves. A great deal of research shows that disruptive children are likely to suffer negative social and educational consequences including retention and eventually dropping-out. We plan additional analyses during the next two years to estimate the effects of disruptive children on their peers within Pre-K and kindergarten classrooms.

The effectiveness of Pre-K teachers whose highest credential is the Child Development Associate (CDA) or similar credential decreases as their years of experience mounts. The effects of teachers with CDA credentials early in their careers is often positive when compared to teachers with college degrees, however, the performance of students taught by CDA holders with more than five years of experience is

often significantly worse than those taught by other teachers. The impact of teachers with CDA credentials who had been teaching several years was strongest in the first grade and had dampened but was still significant at the end of the students' third year of elementary school. The impacts of state certified teachers were more positive with children in more disadvantaged classrooms.

In previous years, child-centered Pre-K teachers have registered positive effects on their students when compared with more directive teachers and teachers whose beliefs and practices are in conflict (conflicted teachers). Similar but often weaker effects were found for child-centered kindergarten teachers. As we show in Section 3, the categorization of teachers used in previous years did not fit first- and second-grade teachers as well as it did teachers in Pre-K and kindergarten. In this report, we have chosen to analyze the influence of each Pre-K and kindergarten teacher's child-centered beliefs and practices on their students' outcomes. The influence of child-centered beliefs and practices appears to be significant for most academic and other ratings only through kindergarten. An exception is in the social behaviors where effects are significant through the second grade. We plan to conduct further analysis on the complex relationships between teachers' characteristics and attitudes and children's social behaviors, their retention, and their academic performance as a follow-up to these findings. It would be consistent with other research to find significant effects of child-centered instruction on increasing high school graduation and increasing independence from social services.

Across the board, the skills and behaviors that students brought with them to Pre-K, and their family characteristics are larger influences on their academic performance, readiness for third grade, communication skills, and social behaviors. The most influential family characteristic is the highest education level for an adult in their household. Interestingly, income, as measured as either household income or eligibility for a means-tested government program (Category One), appears to be more influential at the end of the second grade than in earlier years. Married parents who live together have positive effects on students' social behaviors, but no effects on academic skills. Gender effects for math and science have begun to abate, but girls still outperform boys in all other areas. As in previous years, African American students performed less well than white students, after controlling for other characteristics and experiences. Alarmingly, this difference appeared to be getting larger rather than smaller by the end of these students' third year of formal education. On a positive note, the performance of children of other races, which includes multiracial, Asian, Native American, and Hispanic students, was as high or higher than white students in science, readiness for third grade, and social behaviors.

In the next six sections, we present a more detailed analysis of the influences of these child, Pre-K, and kindergarten characteristics on student performance. In the discussion, we will focus on three factors--teacher quality, teachers' beliefs and practices, and disruptive children in Pre-K classrooms. We will also discuss the impact of transition from Pre-K to kindergarten within the same school, a transition that is expected by many child development experts to have a large impact on the children. We do not discuss the effects of most characteristics of the children or of their families in the following sections, unless the patterns are unusual or unique for a particular outcome.

Influences on Language Arts Performance

Teachers' Beliefs and Practices

Teachers were asked to respond to fourteen items--seven belief and seven practice statements--that reflect their attitudes about teaching young children. These fourteen items were averaged to develop a scale of teachers' beliefs and practices that ranged from one, which represents more adult-directed teaching to ten, which represents more child-centered teaching. Therefore, the higher the average rating, the more child-centered the teachers' beliefs and practices appear to be. Most teachers averaged between five and eight on the ten-point scale.

More child-centered teachers assessed their students about .13 point higher in language arts abilities for every one point increase in the beliefs and practices scale. However, these effects rapidly diminished over time. By the kindergarten year, the effect is .05 and by first grade, the effect is effectively zero.

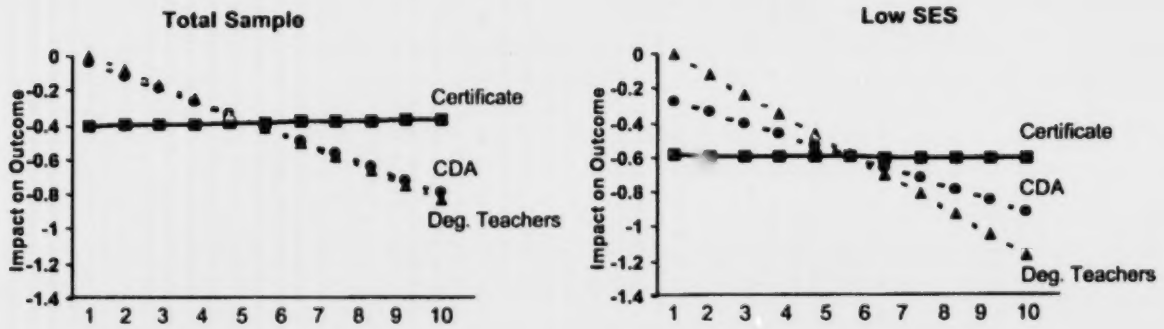
Turning to the effects of kindergarten teachers, across all periods, the effects are insignificant. However, more child-centered teachers are significantly more effective than other teachers with more economically disadvantaged classes. The effects in these classrooms persist through the second grade.

Teacher Qualifications

We measured teacher qualifications based on years of experience and type of credential. For the Pre-K models, we compared both CDA and state certified teachers to a reference group of other types of certifications, which included certifications such as Montessori and related college degrees. For the kindergarten models, we compared teachers with early childhood education, elementary education and other types of certifications to those teachers who had both early childhood and elementary education certifications. Because teaching skills change over time, and the changes in teaching skills may be impacted by teacher credentials, we included a factor that allowed us to analyze the effects of number of years teaching for each of the credential types. We will discuss the overall effect of years teaching, credentials and credentials and years teaching multiplied together instead of individual attributes. Though the CDA certificate is no longer a sufficient qualification for Pre-K teachers, we can assess the impact of CDA teachers on the long-term development of children. It is important to note that when we discuss teacher credentials, our interest is in the effects that teachers with the three types of credentials have on student-level outcomes.

In the Pre-K year, the type of certification had little impact upon language arts outcomes, except for CDA teachers who had eight years or more of experience. Children taught by CDA teachers with two years or less of teaching experience had language arts outcomes that were more than .38 point higher than other types of certificates and significantly higher than students of certified teachers. This was the case for both the kindergarten and first-grade years. While the language arts scores for children of teachers with CDA credentials or degrees but no certification declined as the teachers' years of experience increased, certified teachers in kindergarten through the second grade were as effective throughout their teaching experience.

Figure 2. The Combined Effect of Type of Certification and Years of Experience on Language Arts Outcomes



In the kindergarten year, the three types of ratings were the early childhood education (Grades P – 5), elementary education (Grades K – 8) and other types of certificates (mainly special education). Teachers who held one of these types of certificates were compared to those who held both early childhood and early elementary certificates, which is the most common type of certificate. Other certificates usually denoted some type of special education instructor, but may also include those with temporary qualifications. Because these teachers are likely to be teaching students with special needs, we would anticipate lower ratings associated with teachers with other certification types.

Turning to the kindergarten analysis of language arts scores, we found that teachers who had either early childhood education or elementary education certifications rated their students' language arts skills somewhat higher (.6 point) than those who had both types of certification. For teachers with early childhood education certificates, this difference disappeared by the first grade, but persisted for early elementary certificate holders. By the second grade, students of teachers with both certifications averaged about .6 point higher than those having only one type of certification. The large differences in these patterns across years should caution against drawing conclusions about any differences in effectiveness of kindergarten teachers based on their credentials.

We also examined the effect of kindergarten teachers who have received an advanced degree. The findings were generally insignificant for all outcomes, though the first-grade year did show a significant negative finding. However, receiving a degree was highly correlated with years of experience, the more experience the greater the likelihood of receiving an advanced degree, so the findings are too interconnected for the two factors to be reliable indicators of the actual effect of holding an advanced degree. Since there were no meaningful findings, we have not discussed advanced degrees in any other section.

Children's Age and Class Disruptions

Larger numbers of disruptive children in a Pre-K class had detrimental effects upon classroom outcomes for all affected students, although the effects are smaller in later years. In the Pre-K year, for every disruptive student, language arts outcomes fell by about .11 point. In the kindergarten year, for both models, disruptive children resulted in lower outcomes by about .07 point. This fell to about .05 point for the elementary years in both models, though the significance levels of the Pre-K model were moderate at best.

Children are permitted to enter Pre-K if they are four years old by September 1, the cut-off day for Pre-K eligibility. Therefore, children can be up to just under one year apart in age at the start of school. We examined the effect on outcomes based on the age of the child at the start of school. Age had a significant impact upon language arts outcomes. In the Pre-K year, a year's difference in age resulted in a .46 point differential in language arts outcomes. The impact of age persisted at about the same level for the kindergarten and first-grade years, but fell to about a .29 point difference by the second-grade year. For children in more disadvantaged classrooms, the effect in second grade was much larger, about .4 point.

At the national level, researchers have identified transition to kindergarten from pre-school as having the potential to affect the social, emotional, and educational outcomes for children. In Georgia, this may become a consideration in the approval of new Pre-K sites, in decisions by Pre-K providers to offer kindergarten at the same site, as well as in the choices that parents make about their children's Pre-K. To examine this issue, we compared the outcomes of children who attended Pre-K and kindergarten at the same site with children who moved to a different site for kindergarten. For each year of the study, if a student stayed at the same site for Pre-K and kindergarten, their language arts ratings were significantly higher. Generally, across the three years, those students who transferred within the same site had language arts scores that were about .15 point higher than those children who went to a new site for kindergarten.

Table 7. Language Arts Models

	Gains from beginning of Prekindergarten year to				Gains from beginning of Kindergarten year to		
Variables	End of Pre-K	End of Kindergarten	End of 1st Grade	End of 2nd Grade	End of Kindergarten	End of 1st Grade	End of 2nd Grade
Teacher Beliefs and Practices	.128**	.054*	.002	.030	-.049	-.023	-.004
Teacher Years	-.019	-.066**	-.118**	-.083**	.059**	.001	-.032
CDA	-.042	.522	.593*	-.040			
Certificate	-.078	-.495**	-.616**	-.403**			
Certificate * Yrs	.019	.060**	.101**	.087**			
CDA * Yrs	-.017	-.075	-.082*	.008			
ECE					.684*	.003	-.817**
EE					.897**	.846*	-.615*
Other					-.232	-.228	-.878**
ECE * Years					-.053*	-.003	.051**
EE * Years					-.083**	-.071*	.025
Other * Years					-.015	.014	.048
Adv. Degree					.127	.084	.008
Disruptive Kids	-.113**	-.052**	-.025	-.029*	-.079**	-.074**	-.064**
Age	.464**	.570**	.488**	.276**	.549**	.561**	.300**
Transition					.148*	.177**	.138**
Education	.106**	.133**	.203**	.169**	.117**	.229**	.172**
Income	.026	.010	.037*	.057**	.009	.045*	.056**
Category 1	.073	-.125	.164*	.068	-.201**	.044	-.041
Sex	-.253**	-.315**	-.363**	-.342**	-.265**	-.390**	-.337**
Black	-.183**	-.002	-.106	-.179**	.095	-.098	-.121**
Other Race	-.193*	-.096	-.116	.096	-.027	-.025	.113
Marital Status	-.172**	.071	.061	-.005	.033	-.006	-.046
Communication							
Behavior							
Academic	.671**	.529**	.573**	.437**	.674*	.530**	.465**
Intercepts	2.325**	2.429**	2.945**	2.676**	2.121**	2.215**	3.301**

Influences on Math Performance

Teachers' Beliefs and Practices

More child-centered beliefs and practices had immediate benefits to children in the prekindergarten year, but the benefits diminished afterward for the overall sample. By the kindergarten year, each one-point increase in beliefs and practices resulted in a .05 increase in math outcomes. While the average Pre-K student did not appear to significantly benefit in math from teachers' child-centered beliefs and practices, those in classrooms with high concentrations of disadvantaged students did benefit significantly. Similar to other outcomes, kindergarten teachers' beliefs and practices had negligible impacts upon the children's math outcomes.

Teacher Qualifications

CDA teachers were not more or less effective than other teachers in terms of imparting math skills. However, after about four to five years of teaching experience, CDA teachers' students started to significantly under-perform children from classes that had certified teachers.

Students of certified teachers were insignificantly different from students of other types of certified teachers in the Pre-K year. However, in all other years, students of certified prekindergarten teachers received significantly lower math ratings. Whereas the effectiveness of other teachers declines with years of experience, for certified teachers, their students' scores are not lower for more experienced teachers.

Students of teachers with elementary education certificates (Grades K – 8) generally outperformed students from classes that had teachers with early childhood certificates (Grades P – 5). The differences in the kindergarten year were inconsequential, but the differences in the first-grade year were quite large. However, after several years of experience, the differences between the two types of certificates narrowed substantially. The benefits of the elementary education certificate remained through the second grade, though the spread was only moderately significant. Additionally, more years of experience decreased the differences.

Children's Age and Class Disruptions

Disruptive children had a significant, but diminishing effect on math outcomes over time. For every disruptive student in a prekindergarten class, math ratings were .09 point lower. This effect fell to about -.04 point in the kindergarten year, though the impact of disruptive students was still significant. By elementary grades, the impact was estimated at -.02 point, which was insignificant. These effects were twice as large by second grade for students in more disadvantaged classrooms. Disruptive children in the kindergarten class seemed to have a more persistent and negative effect. While disruptive children lowered the rating of peers in kindergarten and in first grade by about -.05 point, this effect became stronger, about -.07 point in second grade.

As in the other outcomes discussed, younger children received significantly lower ratings than older children. Throughout the study, math scores were about .40 point lower for children who turned four in August or September 1996 than for their peers who were just about five at that point. Again, these effects were larger for the children in more socio-economically disadvantaged classrooms. Math ratings were significantly impacted by children moving to kindergarten within the same site as the Pre-K program. In the kindergarten and second-grade years, children who transferred within the same site had math ratings .17 point higher than children who transferred to a kindergarten at a different site. In the first-grade year, the benefit of transferring to an on-site kindergarten was .25 point.

Table 8. Math Models

	Gains from beginning of Prekindergarten year to				Gains from beginning of Kindergarten year to		
Variables	End of Pre-K	End of Kindergarten	End of 1st Grade	End of 2nd Grade	End of Kindergarten	End of 1st Grade	End of 2nd Grade
Teacher Beliefs and Practices	.120**	.050*	-.013	.029	-.043	-.050	.002
Teacher Years	.014	-.069**	-.119**	-.092**	.048**	-.024	.006
CDA	-.074	-.087	.512	.050			
Certificate	.070	-.547**	-.521**	-.493**			
Certificate * Yrs	-.009	.053**	.104**	.094**			
CDA * Yrs	-.049	-.014**	-.052	-.002			
ECE					.425	-.195	-.320
EE					.466	.524	.074
Other					-.029	-.730	-.363
ECE * Years					-.035	.012	.004
EE * Years					-.036	-.026	-.018
Other * Years					-.038	.060	.004
Adv. Degree					.144	.088	.002
Disruptive Kids	-.091**	-.038*	-.013	-.029	-.050*	-.043	-.069**
Age	.415**	.500**	.362**	.359**	.439**	.359**	.401**
Transition					.161**	.247**	.172**
Education	.105**	.092**	.151**	.166**	.066*	.177**	.170**
Income	.033*	.018	.035	.063**	.018	.044*	.070**
Category 1	.111	-.114	.063	.072	-.190**	-.026	-.021
Black	-.200**	-.064	-.138*	-.276**	.022	-.160**	-.231**
Other Race	-.174*	.022	-.164	.141	.067	-.113	.194*
Sex	-.131*	-.113*	-.140**	-.016	-.064	-.159**	-.026
Marital Status	-.152**	.061	.083	.014	.040	.010	-.044
Communication							
Behavior							
Academic	.720**	.484**	.457**	.474**	.612**	.494**	.470**
Intercepts	2.309**	2.938**	4.253**	2.976**	2.781**	4.176**	2.854**

Influences on Science Performance

Science ratings were only obtained for students in the first- and second-grade years of the study. Therefore, we will report the results of the Pre-K and kindergarten models on these years.

Teachers' Beliefs and Practices

Students of more child-centered teachers received first-grade science ratings that were about .3 point lower than those students of teachers whose scores were five points more directive. However, by the second grade, the effects of beliefs and practices had no significant impact upon science ratings. The results from both models were insignificantly positive by the end of the second grade.

Teacher Qualifications

Students of CDA teachers received significantly higher science ratings if the teacher had three years or less of teaching experience. However, teachers with more than about eight years of experience were less effective in terms of increasing their students' science skills when compared to other teachers. This was generally true for both the first and second grades. The science skills of children of certified teachers improved as their experience levels increased, while other teachers were less effective or about the same as their years of experience accumulated. Once again in this skill area, certified teachers improved with greater experience whereas the effectiveness of all other teachers declined.

Students of kindergarten teachers with elementary education certificates and those with early childhood education certificates received insignificantly higher science ratings in the first grade. Students of teachers with other certificates (including special education) received substantially lower first-grade ratings.

Turning to the second grade, we found that students of teachers with elementary education certificates received about the same ratings as those of teachers with both certificates, and scored about .20 point higher than those of teachers with just early education certificates. These results were generally constant, regardless of years of experience. Students of teachers with other types of certificates received second- grade science ratings generally in line with students of teachers holding both types of certifications.

Children's Ages and Class Disruptions

Disruptive children in the prekindergarten or first-grade year had no impact upon first grade science ratings. In the second grade, for every disruptive child in prekindergarten, science ratings were .04 point lower, a figure that is marginally significant. However, more disruptive children in kindergarten resulted in significantly lower second-grade science ratings. The results suggest that for each additional disruptive child, science ratings were .10 point lower.

According to both models for each year except first grade in the kindergarten model, age had a significant impact upon science outcomes. A one-year difference in age was suggestive of about a .36 point difference in science ratings. However, there was no significant relationship between age and science ratings in the first grade according to the kindergarten model.

Transition had an insignificant effect on first-grade science scores, but a larger effect on second-grade scores. Second-grade science ratings were .19 point higher than children scored who did not stay at a same-site kindergarten.

Table 9. Science Models

	Gains from beginning of Prekindergarten year to		Gains from beginning of Kindergarten year to	
Variables	End of 1st Grade	End of 2nd Grade	End of 1st Grade	End of 2nd Grade
Teacher Beliefs and Practices	-.063**	.012	-.091*	.018
Teacher Years	-.061	-.088**	-.040	.012
CDA	.738**	.010		
Certificate	-.343**	-.400**		
Certificate * Yrs	.042*	.082**		
CDA * Yrs	-.121**	-.008		
ECE			-.060	-.204
EE			.257	.102
Other			-1.236*	.014
ECE * Years			.012	-.001
EE * Years			.013	-.010
Other * Years			.050	-.032
Adv. Degree			-.065	.075
Disruptive Kids	-.018	-.035*	-.032	-.096**
Age	.327**	.353**	.073	.402**
Transition			.048	.187**
Education	.166**	.193**	.066	.199**
Income	.027	.075**	.008	.078**
Category 1	.100	.069	-.284**	-.048
Black	-.248**	-.302**	.027	-.233**
Other Race	-.196	.265**	-.151	.303**
Sex	-.066	-.092	-.017	-.100*
Marital Status	.077	-.004	-.035	-.049
Communication				
Behavior				
Academic	.376**	.490**	.623**	.470**
Intercept	4.404**	3.174**	5.439**	2.776**

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Influences on Readiness for Third Grade

Teachers' Beliefs and Practices

The beliefs and practices of teachers have considerable impact on the readiness of children for kindergarten and first grade, but the impacts diminish after the kindergarten year. For Pre-K teachers, for both the kindergarten and first-grade readiness, for each point average increase in the teachers' beliefs and practices, readiness ratings rose between .05 and .06 point. However, in all other models and in all other years, there was no significant relationship between beliefs and practices and outcomes. However, these impacts may influence teachers' decisions about placement and special programs that do influence outcomes in later years.

Teacher Qualifications

Once again, a complicated relationship between type of credentials and years of experience appears to affect this outcome. Readiness for the next grade was on par between teachers with CDA credentials with just a few years of experience and uncertified teachers with college degrees. However, students of the more experienced teachers with CDA credentials were less ready for the next grade. After the Pre-K year, students of certified teachers received readiness ratings below those of other students, but more experienced certified teachers were more effective, especially after about six years. Students in disadvantaged classes clearly benefited from more experienced certified teachers, but other teachers were less effective as their experience increased.

First-grade readiness was higher for the students of teachers with elementary education certificates, but by the time third-grade readiness was assessed, children with teachers holding both early childhood and early elementary certificates out-performed those of teachers with one of the certificates or other types of certificates. Experience of kindergarten teachers had little influence on the students' readiness. Across all years, students of teachers with other certificates received substantially lower readiness ratings.

Childrens' Age and Class Disruptions

Disruptive children had a moderately negative effect on their own readiness ratings and those of their classmates, but these effects diminished to the point of being nearly insignificant in the study's fourth year. In the prekindergarten year, for each additional disruptive child in the class, average readiness ratings for all students in the class were lowered by an average of .11 point. The impact of disruptive children fell slightly during the kindergarten year to about .07 point for both the Pre-K and kindergarten models. During the elementary school years, early class disruption that is in the prekindergarten and kindergarten classes had only a moderately significant impact. Each disruptive child generally lowered readiness ratings by about .05 points.

Age continued to have a significant impact upon student outcomes. Readiness ratings for children that were one year older than the youngest children in the study received readiness ratings that were generally .50 points higher across all the study years.

While kindergarten readiness ratings were not affected by transferring to kindergarten at the same school, the elementary readiness ratings were significantly impacted. For both the first and second grade readiness scores, children who transitioned to a kindergarten class at the same site where they attended Pre-K received ratings that were .23 point higher than those who transferred to an off-site kindergarten.

Table 10. Readiness Models

Variables	Gains from beginning of Prekindergarten year to				Gains from beginning of Kindergarten year to		
	End of Pre-K	End of Kindergarten	End of 1st Grade	End of 2nd Grade	End of Kindergarten	End of 1st Grade	End of 2nd Grade
Teacher Beliefs and Practices	.053**	.062**	.021	.036	.002	-.083	-.015
Teacher Years	.003	-.048**	-.131**	-.089**	.028	-.006	-.029
CDA	.225	.073	.438	.211			
Certificate	-.065	-.656**	-.606**	-.465**			
Certificate * Yrs	-.003	.031	.104**	.092**			
CDA * Yrs	-.067	-.040	-.054	-.028			
ECE					.332	-.149	-.740**
EE					.799*	.578	-.572
Other					-.642	-.521	-1.210**
ECE * Years					-.026	.002	.043
EE * Years					-.083**	-.034	.029
Other * Years					.008	.026	.070
Adv. Degree					-.024	.225	-.004
Disruptive Kids	-.113**	-.062**	-.042	-.039*	-.089**	-.063*	-.054
Communication							
Age	.492**	.477**	.543**	.442**	.510**	.576**	.462
Transition					.053	.216**	.237**
Education	.093**	.104**	.224**	.195**	.097**	.244**	.204**
Income	.019	.002	.041	.072**	.006	.046*	.076**
Category 1	.081	-.120	.158	.040	-.137	.000	-.094
Sex	-.199**	-.309**	-.302**	-.330**	-.257**	-.333**	-.335**
Black	-.133**	.043	-.171*	-.159**	.101	-.162	-.089
Other Race	-.009	.056	-.123	.210*	.119	-.021	.254**
Marital Status	-.140*	.112	.124	.001	.088	.078	-.067
Behavior							
Academic	.669**	.529**	.659**	.606**	.639**	.650**	.619**
Intercept	3.161**	3.377**	2.190**	2.607**	2.834**	2.222**	3.079**

Influences on Communication Skills

Teachers' Beliefs and Practices

Pre-K teachers with more child-centered beliefs and practices show positive effects on children's communication skills ratings at the end of the Pre-K and kindergarten years. For every one-point increase in the average beliefs and practice rating, students are rated .13 point higher. However, this benefit diminishes in the kindergarten year to a smaller, but still significant .07 point higher rating. By the time the child is in elementary school, the influences of prekindergarten teachers' beliefs and practices have diminished to near zero. Kindergarten teachers' beliefs and practices have no effect on communication outcomes.

Teacher Qualifications

Differences between Pre-K teachers with CDA certificates and certified teachers were much smaller in the Pre-K year and kindergarten year, and significantly larger in the elementary grade years, when comparing student outcomes. However, the differences were offset by experience of the teachers, that is the effectiveness of teachers with CDA credentials declined over time and the effectiveness of certified teachers increased. Generally, there was little difference between certified teachers and teachers who have other certificates on child outcomes, except for the first-grade year. The impact of certified Pre-K teachers was negative, but their effectiveness increased with more years of experience. In other words, certified teachers with little experience were less effective than teachers with college degrees and similar levels of experience, but certified teachers with more experience were more effective than teachers with college degrees who had similar levels of experience.

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Turning to the kindergarten analysis, except for the first-grade year there is little difference in effectiveness between teachers with early childhood education and elementary education certificates. Additionally, years of experience had little impact upon child ratings. Students of kindergarten teachers who had both certifications had better communication skills than those of all other teachers in the second-grade year, about .90 point higher. But with more experience, teachers with either early elementary or elementary education certificates but not both gained on those with both.

Children's Age and Class Disruptions

Disruptive children have a negative impact on their peers' communications ratings. This effect is larger from kindergarten classes than from Pre-K classes. In the Pre-K year, for every disruptive child, members of the class received communications ratings that were .11 point lower, on average. However, these effects diminished immediately, and were only significant again in the second grade. Even then, the results suggest that for every disruptive child, members of the class received ratings that were .03 point lower. The effects of kindergarten disruptions were more pronounced and significant. In the kindergarten year, for every disruptive child, the class members received average ratings that were .07 point lower. For the elementary grades, the effects of kindergarten disruptive children fell to about .06 point decrease in communications ratings for every disruptive child in class.

Except for the kindergarten year, older children received significantly higher communications ratings. The results were .30 point higher in the Pre-K year. During their elementary-grade years, the oldest children received communications ratings about .44 point higher than the youngest, while the effects in the second grade suggest a .26 point benefit to older children. The effects were larger for those students in more disadvantaged classes.

Transitioning within the same school had significant effects on communication skills. While the effects on the kindergarten year were insignificantly positive, the effects on the elementary grades were positive and highly significant. If one transitioned within the same site, communications ratings increased .25 point in the first grade and .14 point in the second grade.

Table 11. Communication Models

Variables	Gains from beginning of Prekindergarten year to				Gains from beginning of Kindergarten year to		
	End of Pre-K	End of Kindergarten	End of 1st Grade	End of 2nd Grade	End of Kindergarten	End of 1st Grade	End of 2nd Grade
Teacher Beliefs and Practices	.129**	.073**	.012	.045	-.020	-.015	-.004
Teacher Years	-.004	-.037**	-.122**	-.056**	.017	-.001	-.049**
CDA	.073	-.308	.331	-.031			
Certificate	.101	-.322**	-.552**	-.261**			
Certificate * Yrs	-.005	.030	.096**	.057**			
CDA * Yrs	-.030	.006	-.048	-.014			
ECE					-.060	-.389	-.898**
EE					-.227	.683	-.849**
Other					-.768*	-.527	-1.211**
ECE * Years					-.011	.015	.071**
EE * Years					-.000	-.065	.067**
Other * Years					.031	.028	.074**
Adv. Degree					-.029	-.148	.026
Disruptive Kids	-.105**	-.014	.017	-.032*	-.069**	-.058**	-.053**
Age	.303**	.025	.393**	.249**	.080	.484**	.266**
Transition					.070	.251**	.143**
Education	.074**	.099**	.150**	.129**	.084**	.160**	.137**
Income	.013	.010	.015	.033**	.012	.030	.031**
Category 1	.115*	-.012	.059	-.035	-.050	-.037	-.153**
Sex	-.160**	-.144**	-.324**	-.340**	-.155**	-.374**	-.341**
Black	-.153**	-.012	-.144*	-.187**	.039	-.222**	-.109**
Other Race	-.077	-.088	-.135	.099	-.163	-.141	.056
Marital Status	-.156**	.113	.049	.085	.101	-.066	.058
Communication	1.081**	.709**	.752**	.116	.387**	.296**	-.070
Behavior	-.389**	-.236**	-.494**	.165**	-.079	-.239**	.270**
Academic	-.063	-.023	.142**	.236**	.161**	.322**	.290**
Intercept	3.266**	4.695**	3.841**	3.493**	5.072**	3.536**	4.385**

Influences on Social Behaviors

Teachers' Beliefs and Practices

Pre-K teachers' beliefs and practices have the greatest effects on social behaviors in terms of gains from the Pre-K year. The impact of prekindergarten teachers' beliefs and practices on kindergarten and second-grade outcomes averaged about a .05 point increase in behavioral outcomes for every one point increase on average in the beliefs and practices. The effects of kindergarten teachers' beliefs and practices on kindergarten through second-grade gains in social behaviors were insignificant.

Teacher Qualifications

Students who had experienced Pre-K teachers with CDA certificates attained lower behavioral outcomes across all years. CDA teachers with just a few years of teaching experience were about the same in terms of effectiveness of their students' social behaviors as other teachers. The children taught by inexperienced certified teachers received lower social behavior ratings than those of other teachers.

No clear pattern of greater or lesser effectiveness of kindergarten teachers with different types of certification was found when we analyzed social behaviors. By the end of the students' third year of elementary school, those who had kindergarten teachers with several years of experience who held either the early childhood education or elementary education certificates showed marginally better social behaviors than the less experienced teachers with the same certificates. But the outcomes were about the same as those holding both certificates.

Children's Age and Class Disruptions and Transition

Starting with the Pre-K model, for every disruptive child in the class, teachers rated students social behaviors about .13 point lower on average. However, this effect quickly dropped, resulting in little impact on the kindergarten and first-grade outcomes. However, effects did re-emerge in the second-grade year, where, for every disruptive child, outcomes were about .06 point lower. Turning to the kindergarten model, disruptive kindergarten classes had consistent and longer lasting impacts upon behavioral outcomes. For every disruptive child in a kindergarten class, teachers gave students lower behavioral ratings, averaging .10, .05 and .08 in the kindergarten, first- and second-grade years, respectively.

Generally, older children received higher behavioral ratings than younger children. In the Pre-K year, a one-year age difference resulted in a .22-point difference in social behaviors. In both models, there was no significant difference in the kindergarten year. The first-grade differences were by far the most dramatic. In both models, older children received about .47 point increase over younger children on the behavioral outcomes. Finally, in the second grade, the differences remained significant, but fell to about an .18 point advantage for the older child.

In terms of social behaviors, staying at the same site produced no significant effects in the kindergarten and first-grade year, but it was associated with a significant boost in the second grade. The ratings of social behaviors increased about .13 point if one transferred from Pre-K to kindergarten at the same site.

Table 12. Behavior Models

	Gains from beginning of PreKindergarten year to				Gains from beginning of Kindergarten year to		
Variables	End of Pre-K	End of Kindergarten	End of 1st Grade	End of 2nd Grade	End of Kindergarten	End of 1st Grade	End of 2nd Grade
Teacher Beliefs and Practices	.219**	.058**	.005	.043**	-.015	-.052	-.007
Teacher Years	.015	-.068**	-.032*	-.041**	.049*	-.007	-.026
CDA	.107	-.131	.684**	-.183			
Certificate	.120	-.395**	-.301**	-.196			
Certificate * Yrs	-.016	.051**	.005	.034**			
CDA * Yrs	-.060	.013	-.141**	.010			
ECE					.557*	-.442	-.466
EE					.602	.047	-.489
Other					-.391	-.371	-.671
ECE * Years					-.048*	.024	.042*
EE * Years					-.034	.006	.066**
Other * Years					-.019	.038	.029
Adv. Degree					.062	-.294**	-.025
Disruptive Kids	-.133**	-.027	.004	-.056**	-.101**	-.057**	-.078**
Age	.215**	.082	.460**	.161*	.142	.494**	.190**
Transition					.089	.075	.133**
Education	.072**	.145**	.108**	.106**	.141**	.117**	.124**
Income	-.007	-.026	.006	.012	-.018	.004	.014
Category 1	.114	-.185**	-.013	-.152**	-.215**	-.066	-.209**
Sex	-.263**	-.291**	-.255**	-.343**	-.314**	-.250**	-.347**
Black	-.128*	.070	.018	-.113*	.154*	.019	-.032
Other Race	.119	.133	.209**	.309**	.164	.176	.292**
Marital Status	-.058	.280**	.235**	.223**	.276**	.211**	.204**
Communication	-.082	-.160	-.129	-.193**	-.458**	-.303**	-.477**
Behavior	1.074**	.582**	.351**	.497**	.718**	.511**	.720**
Academic	-.016	.097	.111**	.152**	.305**	.205**	.250**
Intercept	4.693**	5.310**	2.561**	3.706**	5.190**	3.165**	4.374**

3. Classroom and Teacher Characteristics

One objective of the Pre-K longitudinal study during the 1999-2000 school year was to describe classroom characteristics and teacher characteristics of students in the sample during their fourth year of the study. Over 90 percent of these students were enrolled in a second-grade classroom. Teachers of these students were mailed a survey during spring 2000 that tapped various characteristics of the teacher and the classroom. Of the 1,978 teachers who were mailed the teacher survey, 1,442 teachers completed and returned it. This resulted in a response rate of 72 percent. The following section that describes classroom characteristics includes responses made by the 1,205 teachers who reported that they teach second grade. Some later sections that describe teacher characteristics analyze responses by all teachers who responded to the teacher survey, rather than responses made by second-grade teachers only. The sample size for each analysis varies slightly from the total number of returned surveys because some of the items had missing and invalid responses.

Second-Grade Classroom Characteristics

Class size is one characteristic of the second-grade classroom that is often expected to influence student performance. The average number of students enrolled in the study's second-grade classrooms is 20.98. A majority of teachers report that between 20 and 24 students were enrolled in their classroom, while nearly 11 percent of the teachers report 25 or more students in their classrooms. As Appendix B shows, the class sizes for kindergarten, first and second grade average about 21 students, which is larger than the average in Pre-K (17.9 average).

Teachers also reported the number of hours per week that other adults were present to assist in their classrooms. The average number of hours per week that a teacher's aide was in each classroom is 7.38, however, responses to this item varied greatly. Nearly half of the teachers (48.2 percent) reported that they did not have a paid assistant in the classroom. Thirty percent of teachers reported that assistants spent 1-10 hours per week in their classroom, while over 11 percent of teachers reported 30 or more hours per week of assistance.

The average number of hours per week that parents volunteered in each classroom is 1.16. The majority of teachers (56.9 percent) reported that parents never volunteer in their classrooms, while more than one-fourth of the teachers (27.6 percent) have a parent volunteer present in their classrooms for 1-2 hours per week. Less than four percent of classrooms had parent volunteers more than five hours per week.

Students who are disruptive are widely believed to distract their teachers from effective instruction. Teachers in this study reported the frequency of student behavior problems in their classrooms. Teachers reported second-grade classrooms had an average of 3.5 students who were characterized as "regularly disruptive." Most teachers (86.5 percent) described their classroom as having five or fewer students who are regularly disruptive, including 90 teachers (7.5 percent) who reported that none of their students were regularly disruptive. Teachers also reported the amount of time spent each day on disciplining students. More than two-thirds of second-grade teachers (67.2 percent) reported spending between a few minutes and thirty minutes per day on discipline problems, while nearly one-third of the teachers (32.3 percent) reported spending more than thirty minutes.

A final characteristic of the classroom that may affect student learning is mobility into and out of second-grade classrooms. Teachers reported that an average of 3.2 students transferred into each classroom, and an average of 3.3 students transferred out of each classroom during the school year. Over ten percent of teachers reported that ten or more students transferred into and out of their classrooms during the school year.

Teacher Characteristics

Demographic characteristics of teachers including race, level of education, certification type, and years of teaching experience are reported in Appendix B for the entire sample of teachers who completed the

teacher survey during the fourth year of the longitudinal evaluation. Within this appendix, teacher characteristics for this sample are compared with the characteristics of teachers from the previous years of the longitudinal study.

The majority of teachers who completed the teacher survey during the fourth year of the longitudinal study were white (81.9%). The remainder of the teachers classified themselves as either black (16.7%) or other (1.4). Teachers in the "other" category identified themselves as either Hispanic, Asian, American Indian, or multi-racial. About half of the teachers (47.3%) reported a college degree was their highest level of education, while the other half (52.6%) reported receiving an advanced degree (master's degree, six-year specialist, or doctoral degree). One teacher at a private school reported less than a college degree. More than half of the sample (55.1%) received teaching certification in Early Childhood Education (P-5), while about one-fifth of the sample (21.5%) held certification in Elementary Education (P-8). The remainder of the sample (20.8%) reported both Early Childhood Education and Elementary Education certificates. Nearly equal proportions of the sample reported 1-2 years of teaching experience (26.8%), 3-5 years of teaching experience (26.6%), 6-10 years of teaching experience (19.6%), and more than 10 years experience (27.0%).

In the study, substantial information was gathered about the teacher's approach to educating young children. The National Association for the Education of Young Children (NAEYC) outlined guidelines for implementing practices within an early childhood classroom that are developmentally appropriate for young children (Bredekamp & Coppel, 1997). These guidelines suggest that child-centered classrooms in which activities are hands-on, organized around the interests of the child, and facilitated by the teacher are conducive to the emotional and cognitive development of young children. Research suggests that classrooms that follow these guidelines for developmentally appropriate practices are more likely to foster healthy learning and development for young children than classrooms that use didactic, teacher-directed activities (Clarke-Stewart & Gruber, 1984; Cost, Quality & Child Outcome Team, 1995; Howes & Olenick, 1986; McCartney, 1984; and Phillips & Howes, 1987). Two instruments were included in the teacher survey to measure the teachers' approach to educating young children, the teachers' beliefs and practices which will be discussed in the next sub-section and the instructional activities scale which will be discussed later. The correspondence between them will be examined in the last sub-section of this section.

Teacher Survey of Beliefs and Practices

The Teacher Survey of Beliefs and Practices developed by Marcon (1992, 1994, 1998) has been used in each year of the study to measure each teacher's approach to educating young children. This survey is comprised of seven pairs of items. The first item of each pair measures a teacher's self-reported belief about a specific aspect of early childhood education; the second item measures the teacher's self-reported classroom practice related to the same aspect of early childhood education.

The seven aspects of early childhood education and the end-points by which each of the rating scales is anchored were derived from theoretical dimensions of differences between models of early childhood education suggested by Minuchin and Shapiro (1983); (Marcon, 1999). Broad differences across early childhood models include: the teacher's scope of developmental goals, the teacher's conception of how children learn, the amount of autonomy the teacher gives to the child, the teacher's conception of his or her role, and whether the teacher provides learning opportunities from peers (Minuchin & Shapiro, 1983).

Responses to each item are made along a ten-point response scale that is anchored by endpoints that relate to whether the teacher takes an adult-directed approach (1) or a child-centered approach (10) to educating young children. Table 13 presents the means for each of the fourteen items and the overall mean for all of the items for the sample of second-grade teachers. End points for each pair of belief/practice items are given in bold. Missing data for belief and practice items were imputed in this analysis and in each of the subsequent analyses of the Teacher Survey of Beliefs and Practices using EM method.

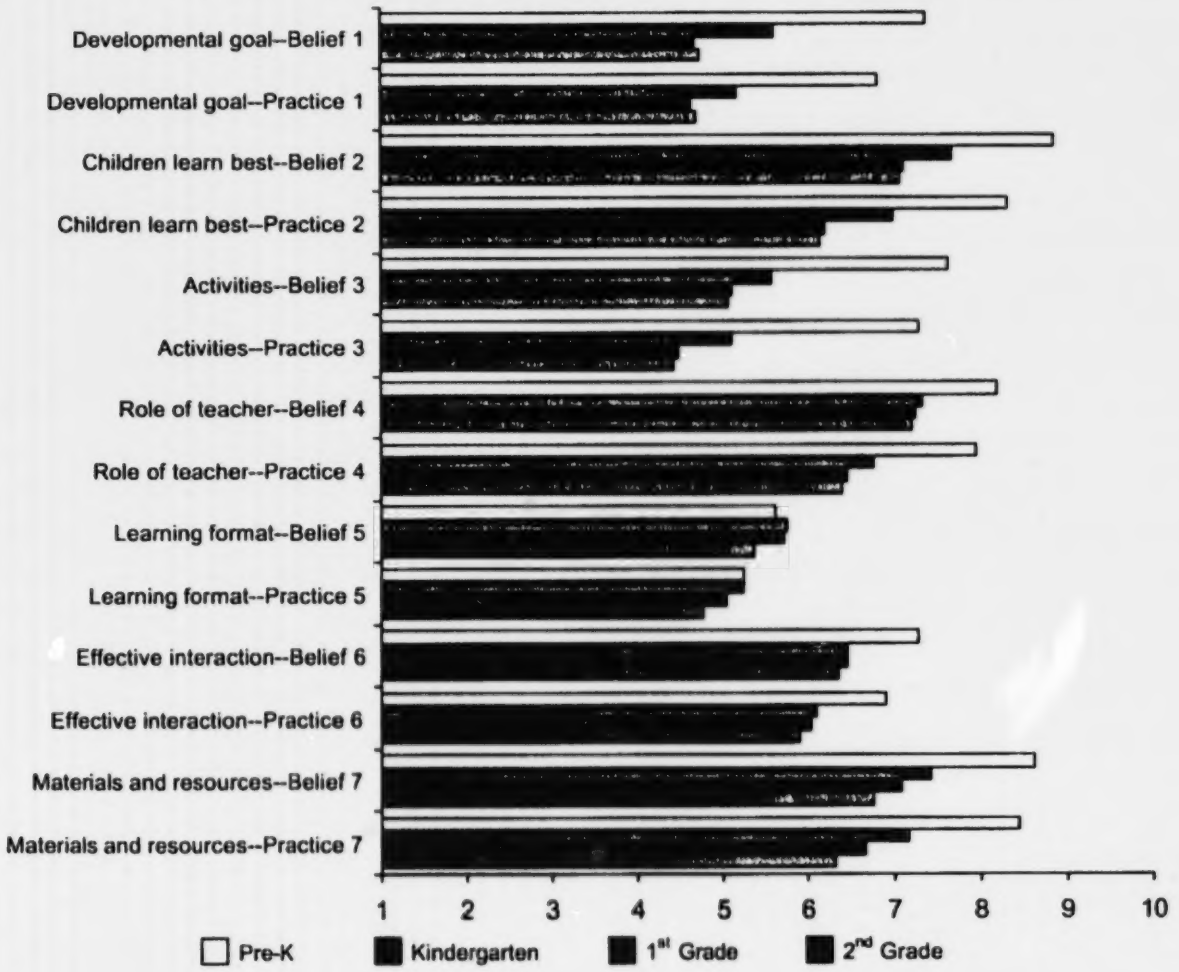
Table 13. Mean Ratings for Second-grade Teachers on the Teacher Survey of Beliefs and Practices (n=1,205)

Item Statement	Mean
1=Academic Preparation and 10=Social and Emotional Growth	
Belief 1: I believe the most important developmental goal of second grade is:	4.72
Practice 1: My second-grade classroom is most effective in fostering:	4.70
1=Direct Instruction and 10=Active Experience	
Belief 2: I believe that second-grade children learn best through:	7.06
Practice 2: Children in my second-grade classroom are learning predominantly through:	6.14
1=Teacher Initiated and 10=Child Initiated	
Belief 3: I believe that activities in a second-grade classroom should be:	5.06
Practice 3: The activities in my second grade-classroom are typically:	4.44
1=Dispense Knowledge and 10=Facilitate Learning	
Belief 4: I believe that my role as a teacher of second-grade children is to:	7.20
Practice 4: In my present second-grade classroom, I am more likely to:	6.40
1=Group Oriented and 10=Individualized One-to-One	
Belief 5: I believe that second-grade programs should use a learning format which is:	5.38
Practice 5: My second grade-classroom is typically:	4.77
1=Adults and 10=Peers	
Belief 6: I believe that second-grade children in a group learn effectively through Interactions with:	6.36
Practice 6: Most learning in my second-grade classroom takes place through interactions with:	5.89
1=Distributed and 10=Child Accessible	
Belief 7: I believe that the class materials and resources for second-grade children Should be:	6.75
Practice 7: In my second-grade classroom, materials and resources are:	6.32
Overall Mean Response:	5.90

Figure 4 presents the means for each of the fourteen items across the four successive samples of teachers who participated in the longitudinal study. This figure shows that the means for most of the items have gradually decreased across the four consecutive teacher samples. This trend indicates that as the students in the longitudinal study progressed to higher grades, teaching styles were more adult-directed. Data collected for the sample of second-grade teachers, however, suggest that this trend stopped. For each of the first eight items on the instrument (Belief and Practice 1 through Belief and Practice 4), the mean rating for the second-grade sample was within .06 of the mean rating for the first-

grade sample (ratings were made on a ten-point scale). For the remaining six items, the mean differences across the two samples are each less than .34. Thus, first- and second-grade teacher samples reported similar overall beliefs and practices concerning early childhood education, and these beliefs and practices are more adult-directed than the kindergarten teacher and Pre-K teacher samples.

Figure 4. Mean Ratings on Beliefs and Practices Survey Items for Pre-K, Kindergarten, First-grade, and Second-grade Teachers



A statistical procedure called cluster analysis was used to systematically categorize teachers based on these beliefs and practices. For each teacher, two variables were computed to cluster teachers' responses. The first variable is the sum of the 14 belief and practice items. The value of this variable reflects a teacher's overall style of teaching. Higher scores reflect a more child-centered approach, while lower scores reflect a more adult-directed approach. The second variable that was computed is the summed difference between each belief and practice item. To compute this variable, each of the seven belief ratings was subtracted from the related practice rating. The resulting seven difference scores were summed, providing a measure of the degree in which a teacher's beliefs conflict with his or her classroom practices.

The two variables computed for the cluster analysis were standardized so that values of both of the variables correspond to the same measurement scale in which the mean is zero and the standard deviation is one. These two standardized values were cluster analyzed using K-means method. The result of the cluster analysis is the assignment of each teacher to a group whose values for these two variables are similar. The analysis was conducted simultaneously on responses from all of the teachers who completed this survey across the four teacher samples in the longitudinal study (n=4,141). The purpose of clustering all of the teachers in the same analysis, rather than conducting a separate cluster analysis for each sample, is so that teachers' assignments to a cluster are made using the same criteria for all samples. This allows for more meaningful comparisons of teaching styles that can be made across samples.

Marcon (1999) reports using a similar cluster analysis procedure for teachers' responses to the Teacher Survey of Beliefs and Practices, and she found five distinct approaches to teaching among early childhood educators. Results from this analysis also identify five clusters of teaching styles that relate to the clusters described by Marcon (1999). Figure 5 presents the mean teacher response to each of the fourteen items for teachers from each of the five clusters. Figure 6 presents the mean of the summed difference scores for each of the five clusters.

The first three teacher clusters that are presented have significantly different over all average scores (Figure 5), and teachers in these groups have a high degree of consistency between their beliefs and practices (Figure 6). Teachers assigned to cluster one have relatively low average responses to the fourteen items (4.85), and relatively low differences between their beliefs and practices (1.87). These teachers are characterized as adult-directed. Teachers assigned to cluster two have average responses that are relatively moderate (6.32), with relatively low differences between their beliefs and practices (.67). These teachers are characterized as middle-of-the-road. Teachers assigned to cluster three have relatively high average responses (8.04), and relatively low differences between their beliefs and practices (1.93). These teachers are characterized as child-centered.

The final two clusters identified by the cluster analysis are characterized by having relatively large differences between their beliefs and practices. Teachers in cluster four have average responses (5.74) between Adult-directed and Middle-of-the-road teachers. The average difference between these teachers' beliefs and practices (18.97) is significantly larger than the average difference reported by teachers in the first three clusters. These teachers are characterized as more directive, highly conflicted. Teachers assigned to cluster five have an average response to the fourteen items (6.40) that is similar to the average reported for Middle-of-the-road teachers. These teachers also report that the mean difference between their beliefs and practices (7.87), which is significantly greater than teachers assigned to the first three clusters. These teachers are characterized as middle-of-the-road, conflicted.

This labeling creates two groups of teachers with scores that average in the middle of the scale and who are referred to as middle-of-the-road. The groups are different in that the middle-of-the-road teachers believe and practice a balance between child-centered and adult-directed instruction. The middle-of-the-road, conflicted teachers generally believe in child-centered instruction, but their actual instruction tended to be more adult-directed. Thus, while the overall averages of the two groups are similar one group had conflicts between their beliefs and practices and the other does not.

Figure 5. Mean Ratings on each of the Fourteen Belief and Practice Items for the Five Clusters of Teaching Styles (n=4141).

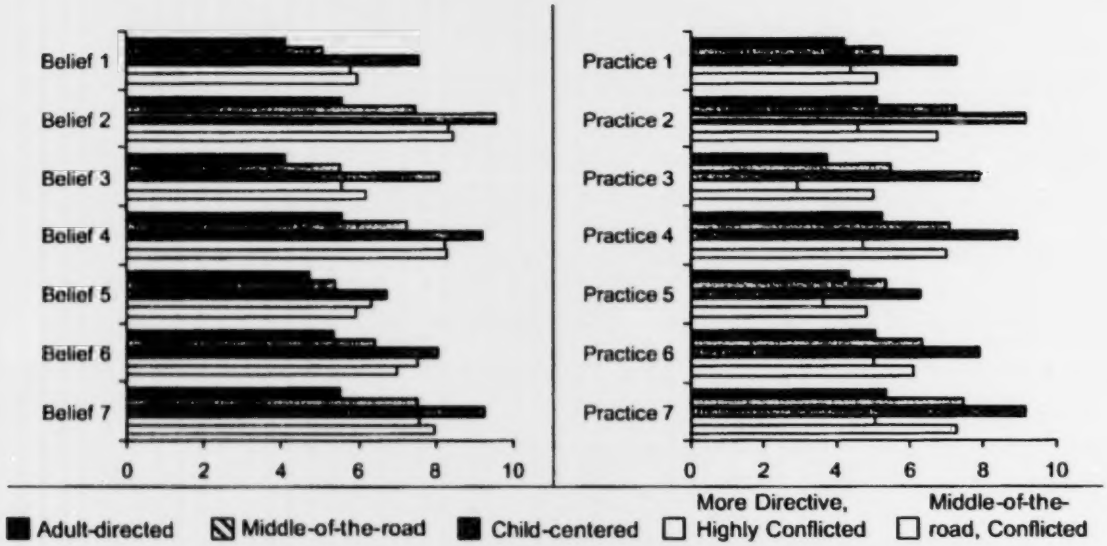
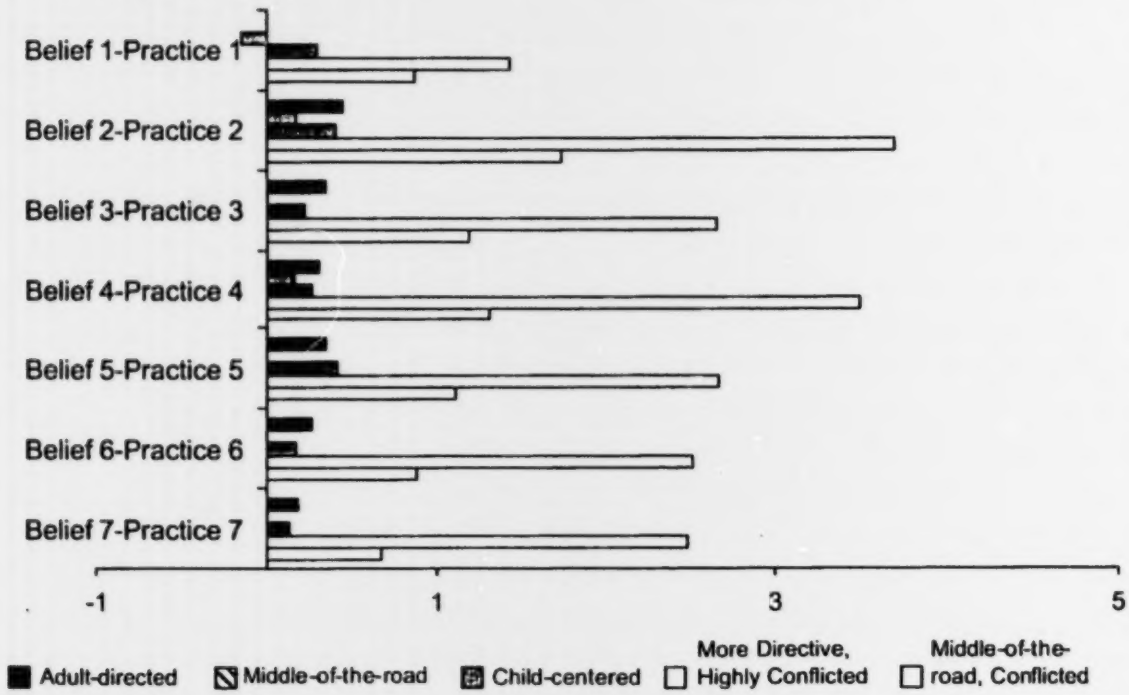


Figure 6. Mean Difference between Belief and Practice Ratings for the Five Clusters of Teaching Styles (n=4141).



Means for each of the items across the four teacher samples (Figure 4) indicated that teachers' beliefs and practices were more adult-directed as the student progressed from Pre-K through first grade, and second-grade teachers' beliefs and practices are, on average, very similar to first-grade teachers. Table 14 presents the cluster membership of teachers within each of the four samples that also provides an indication of differences in teaching approaches across the four years. This table provides further evidence that teachers' beliefs and practices tend to become more adult-directed and less child-centered across each of the four successive teacher samples, and that the proportion of teachers assigned to each of the five clusters is similar for first-grade teachers and second-grade teachers.

Table 14. Teaching Styles of Teachers during each of Four Consecutive Years of the Pre-K Longitudinal Study

Cluster Membership	Sample							
	Year 1 Teachers		Year 2 Teachers		Year 3 Teachers		Year 4 Teachers	
	n	%	n	%	n	%	n	%
1-Adult-directed	11	6.1	304	24.9	432	32.3	476	34.0
2-Middle-of-the-road	40	22.3	437	35.7	430	32.2	495	35.3
3-Child-centered	87	48.6	187	15.3	113	8.5	74	5.3
4-More Directive, Highly Conflicted	1	.6	36	2.9	80	6.0	96	6.8
5-Middle-of-the-road, Conflicted	40	22.3	259	21.2	282	21.1	261	18.6
Total Sample Size	179		1223		1337		1402	

The data in Table 14 indicate that the proportion of adult-directed teachers increased across each of the four teacher samples, while the proportion of child-centered teachers decreased across each of the four successive teacher samples. Further, more teachers are middle-of-the-road than any of the four other groups. Over twenty percent (22.3 percent) of Pre-K teachers were classified as middle-of-the-road, while about one-third of teachers in the three successive samples were classified as middle-of-the-road (35.7 percent, 32.2 percent, 35.3 percent, respectively).

Only 1 of the 179 teachers in the Pre-K sample was characterized as more directive, highly conflicted. Membership in this cluster is the lowest overall, but the proportion of teachers assigned to this cluster has increased across the three subsequent teacher samples, reaching 6.8 percent of the sample of teachers in the current year of the study. Finally, about one-fifth of teachers were assigned to the cluster that is characterized as middle-of-the-road, conflicted. The proportion of teachers assigned to this cluster has remained relatively constant across each of the four successive samples.

While Marcon (1999) originally identified five clusters of teaching styles, she discarded two clusters, analyzing only the influence of three "pure" groupings--adult-directed, middle-of-the-road, and child-centered-- on student outcomes. In previous reports of the Pre-K longitudinal study, a grouping of teachers by three teaching styles was used in analyses that examine the effects of teaching styles on students' academic progress. The three groups seemed to represent well teaching styles in previous years because of the relatively low number of teachers assigned to the cluster that is characterized as more-directive, highly conflicted during the first and second year of the study (.6 percent and 2.6 percent, respectively). Membership in this cluster is more frequent for teachers during Year 3 and Year 4 of the study, so a five cluster solution that separately identifies clusters of teachers who have high conflict between beliefs and practices provides a better representation of teachers in later elementary years. In Appendix B, we compare the previous years' grouping with the five groups in this report.

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Instructional Activities Scale

The Instructional Activities Scale (IAS) was used to measure the frequency with which thirty-four instructional activities occur within a classroom (Buchanan, Burts, Bidner, White, and Charlesworth, 1998). Teachers rated the frequency of each activity in their classrooms by responding along a five-point response scale that ranges from: almost never/less than monthly (1), rarely/monthly (2), sometimes/weekly (3), regularly/2-4 times per week (4), very often/daily (5). Buchanan et al., (1998) factor analyzed responses to this survey and found that two factors of classroom activities exist: one that relates to developmentally more appropriate practices, and one that relates to developmentally less appropriate practices.

Analyses of the responses of first-grade teachers (measured during 1998-1999) and second-grade teachers (measured during 1999-2000) were conducted separately. The results of both analyses identify two distinct groupings of classroom activities. Eighteen items are strongly related to developmentally more appropriate activities in both of the teacher samples. Eight items relate to developmentally less appropriate activities in both samples.

The remaining eight items from the IAS do not appear to relate to either group of activities and these items were not used in subsequent analyses. Some of these eight classroom items (with the mean response by first- and second-grade teachers in parentheses) were used almost daily by most teachers, as indicated by means near five:

- do phonics activities (4.80, 4.64);
- receive tangible reinforcements for appropriate behavior and/or performance (4.18, 4.06);
- receive social reinforcements for appropriate behavior/or and performance (4.94, 4.92);
- get placed in time-out (3.01, 2.71);
- lose special privileges for misbehavior (3.43, 3.22);
- participate in specifically planned outdoor activities (3.36, 3.29);
- read in ability group levels (3.90, 3.89);
- and play competitive math activities to learn math facts (3.27, 3.40).

The exclusion of these items from the following analysis was not because they were not often used, but rather because their pattern of use was not consistent with the others in either group.

The internal consistency for the 18-item sub-scale that relates to classroom activities that are considered developmentally more appropriate is .85 for first-grade teachers, and .86 for second-grade teachers. The internal consistency for an 8-item sub-scale that relates to activities that are considered developmentally less appropriate is .72 for first-grade teachers and .72 for second-grade teachers. The correlation between these two sub-scales is non-significant for first-grade teachers (r=.04) and significant for second-grade teachers (r=.20). Thus, second-grade teachers who report more frequent use of activities that are developmentally more appropriate also were slightly more likely to report more frequent use of activities that are developmentally less appropriate.

Table 15 presents the items that comprise each of the two sub-scales, and the mean response by first-grade teachers and second-grade teachers for each of the items. The items comprising each of the sub-scales are listed in descending order by the mean response made by the first-grade teacher sample. This table suggests that the most frequently implemented activities by first-grade teachers also tend to be the most frequently implemented activities by second-grade teachers. The order of frequency in which first-grade teachers report practicing the eighteen developmentally more appropriate activities and the eight developmentally less appropriate activities is almost identical to the order of frequency reported by second-grade teachers.

While the relative frequency of implementing developmentally more appropriate and developmentally less appropriate activities is similar across the two samples, the means for these items are different across the samples. Twenty-four of the twenty-six items listed in Table 15 have a mean for the first-

grade teacher sample that is higher than the mean for the second-grade teacher sample. This indicates that overall, first-grade teachers report more frequent use of activities that are considered developmentally more appropriate, as well as more frequent use of activities that are considered developmentally less appropriate than the second-grade teacher sample. Second-grade teachers, however, report more frequent testing and more frequent copying from the chalkboard than first-grade teachers.

Table 15. Mean Responses by First- and Second-grade teachers to the Two Sub-scales of the IAS

How often do children in your class:	First-grade Teacher Mean	Second-grade Teacher Mean
Developmentally More Appropriate Activities		
1. Do creative writing (combining symbols/invented spelling and drawing, and conventional spelling)	4.49	4.32
2. Participate in hands-on projects	4.24	4.12
3. Use manipulative (like pegboards, puzzles, Legos, Unific Cubes, tangrams, geoboards, base 10 blocks)	4.18	3.85
4. Select centers (reading, math, science, writing, etc.)	4.07	3.69
5. Play with games and puzzles	3.92	3.61
6. Sing and/or listen to music	3.91	3.71
7. Solve math problems that are incorporated into other subject areas	3.72	3.68
8. Draw, paint, work with clay, and use other art media	3.64	3.39
9. Color and cut freely	3.55	3.34
10. Listen to recordings of children's literature	3.55	3.24
11. Participate in multi-cultural and non-sexist activities	3.52	2.72
12. Move creatively as a planned activity	3.24	3.10
13. Do health and safety activities	3.18	3.16
14. Coordinate their own activities in centers	3.14	2.85
15. Explore life science materials such as animals and plants, and/or physical science materials such as wheels and gears	3.12	3.07
16. Build constructions with purchased and/or recycled materials	2.61	2.02
17. Participate in dramatic play activities	2.35	2.09
18. Play games or do activities directed by or made by parents	1.65	1.64
Developmentally Less Appropriate Activities:		
1. Participate in whole class teacher-directed instruction	4.73	4.71
2. Practice handwriting on lines	4.17	3.90
3. Use flashcards with sight words and/or math facts	3.94	3.73
4. Circle, underline, and/or mark items on worksheets	3.79	3.66
5. Participate in rote counting	3.79	3.05
6. Copy from the chalkboard	3.68	3.80
7. Take tests	3.11	3.40
8. Color and/or cut pre-drawn forms	3.05	2.71

Comparing Teachers' Beliefs and Practices with their Instructional Activities responses
In order to determine whether the two measures of first- and second-grade teachers' approaches to educating young children were consistent with each other, we compared the responses for the two. The Instructional Activities Scale (IAS) and the Teacher Survey of Beliefs and Practices groupings described above were compared.

Figure 7 and 8 depict the relationship between cluster membership and the frequency with which teachers implement developmentally more appropriate and developmentally less appropriate activities for the first-grade teacher sample and second-grade teacher sample, respectively.

Figure 7. Mean Frequency of Developmentally More Appropriate Activities and Developmentally Less Appropriate Activities for the Five Clusters of First-grade Teachers

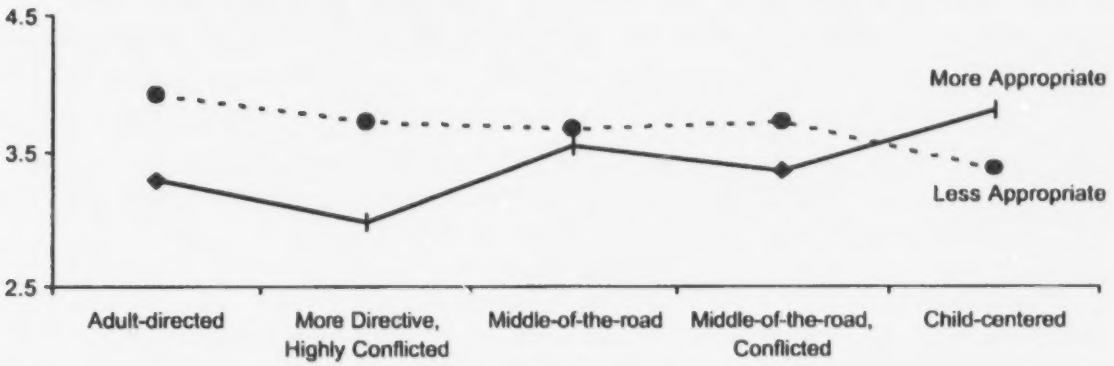
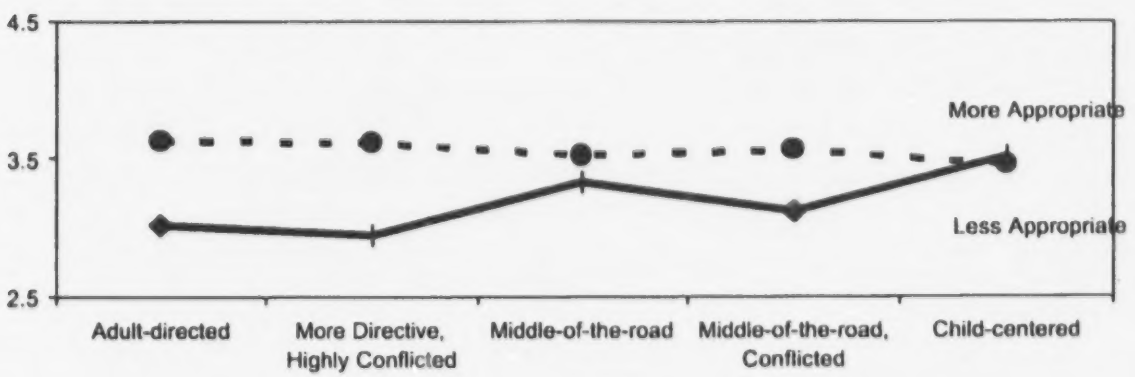


Figure 8. Mean Frequency of Developmentally More Appropriate Activities and Developmentally Less Appropriate Activities for the Five Clusters of Second-grade Teachers



Figures 7 and Figure 8 indicate that the relation between cluster membership and the implementation of developmentally more appropriate activities and developmentally less appropriate activities follows expected patterns for both first- and second-grade teachers. For both first-grade teachers and second-grade teachers, child-centered teachers report the most frequent use of developmentally more appropriate activities, and the least frequent use of developmentally less appropriate activities. In both samples, teachers assigned to the cluster that is characterized as more directive, highly conflicted report

the least frequent use of developmentally more appropriate activities, and teachers assigned to the adult-directed cluster report the most frequent use of developmentally less appropriate activities.

Among first-grade teachers, child-centered teachers use developmentally more appropriate activities more frequently than teachers in each of the four other groups. First-grade, more directive, highly conflicted teachers use developmentally more appropriate practices less frequently than teachers in each of the other four clusters. Second-grade teachers who are child-centered report similar results, except they are not significantly different than middle-of-the-road teachers in their use of developmentally more appropriate activities. Second-grade teachers in the more directive, highly conflicted cluster report significantly less frequent use of developmentally more appropriate activities than child-centered teachers; middle-of-the-road teachers; and middle-of-the-road, conflicted teachers.

Teachers' usage of developmentally less appropriate activities also differed in expected ways for both grades. In the first grade, adult-directed teachers report significantly more frequent use of activities that are developmentally less appropriate than teachers who are child-centered, middle-of-the-road, or middle-of-the-road, conflicted. Further, child-centered first-grade teachers report significantly less frequent use of activities that are developmentally less appropriate than teachers in any of the four other groups. Adult-directed second-grade teachers employ developmentally less appropriate activities more frequently than child-centered teachers.

4. Parent Opinions and Activities

At the end of each academic year, we conduct a survey with the parents of students in our sample. This year, 1,089 parents were surveyed between the months of June and August 2000. The majority of the respondents were the mothers of students in our survey (75 percent), followed by fathers (19 percent), grandmothers (3 percent), and other family members (aunts, siblings, etc.). Attempts were made to survey all parents of children in the sample, not just the parents who had children attending second grade. Because of the relatively low response rates, these results are suggestive of the parents' behaviors and attitudes. Additional efforts were initiated for the fifth year of the study to obtain interviews from a larger percentage of parents.

As with previous years, this year's parent survey continued to address parental perceptions of their child's current school experience. Parents were also asked their attitudes regarding goals of second grade, interactions with their children and restrictions they place on them, and their expectations regarding their children's education. The survey also addressed parent-teacher interactions, as well as attitudes about the community where the school is located and the neighborhood where the child lives. As with previous years, parents are pleased with their children's school experience, support a more academic goal for the second grade, and largely expect their children to attend college. Furthermore, parents report a good relationship with their child's teachers and strong community involvement and neighborhood support.

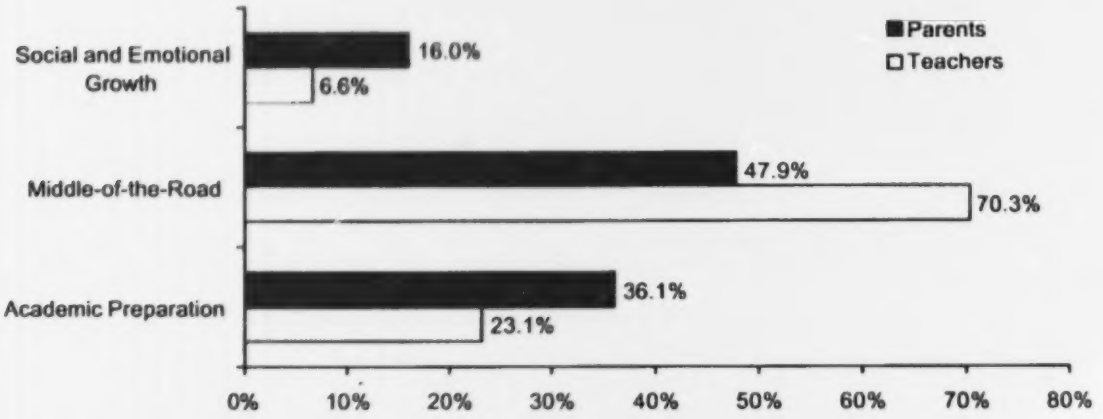
The findings from this year's survey are reported below, separated into the following subsections: 1) parental perceptions of their child's current school experience and their goals for second grade; 2) parental interactions with and restrictions placed on their child; 3) parental expectations of their children's education; and 4) parent-teacher interactions and perceptions of the school community and neighborhood where they live.

Parents' Ratings of their Child's Second-Grade Experience and Attitudes Toward Second Grade

Parents rated their children's schools and teachers using the same grading scale that is often used to evaluate children. The most common grade parents gave to their child's school was an "A" (43 percent), followed by an "A+" (21 percent) and B (16 percent). Overall, 69 percent of parents rated their child's school within an "A" range, 26 percent within a "B" range, and 5 percent within a "C", "D" or "F" range. Parents graded their child's teacher in a similar fashion. The most common grade given was also an "A" (40 percent), followed by an "A+" (31 percent) and "B" (13 percent). Seventy-four percent of parents graded their child's teacher within an "A" range, 20 percent within a B range, and less than seven percent within a "C," "D" or "F" range.

Parents responded to a ten-point scale asking their perception of whether the most important goal for second grade was academic preparation, social and emotional growth or somewhere between. Thirty-six percent of parents responded (with a one, two or three) that the most important developmental goal of second grade was academic preparation (compared with 23 percent of teachers). Forty-five percent of parents felt that both academic preparation and social/emotional growth were equally important (responding with a 4, 5 6 or 7 compared to 70 percent for teachers), while 16 percent said that social and emotional growth was the most important developmental goal of second grade (responding with a 8,9 or 10 compared to 7 percent of teachers. Figure 9 compares the responses of parents to teachers. Parents were more likely to give priority to academic goals than were teachers.

Figure 9. Parent and Teacher Goals



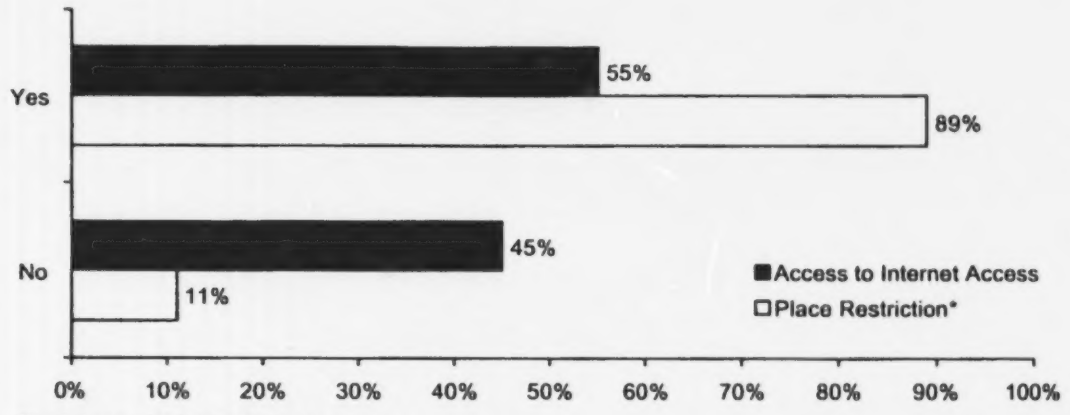
Parent Interactions and Restrictions

We asked parents how often during the past month they had read with their child, helped their child with her or his homework, taken a walk or visited a park with their child or visited a science, historical or art museum. Overall, parents reported a high amount of interaction with their child. Seventy-seven percent of parents responded that they help their child with his or her homework more than once a week, while 69 percent say they read with their child more than once a week. Fifty-four percent said they go on walks or visit parks with their child at least once a week, compared to 22 percent who only do so a couple of times each month. We also asked parents if they considered there to be ample sidewalks and parks in their neighborhood. Parents surveyed were divided in their responses. Fifty-two percent felt there were ample parks and sidewalks compared to 48 percent who did not. The least reported interaction was visiting museums. Thirty-five percent never go to museums and only 10 percent go at least once a week.

We asked parents if they place any restrictions on their child's activities. Specifically we asked if they restrict the amount and type of television their child watches, require completion of chores and imposed restrictions based on their child completing his or her homework. Ten percent of parents responded that they never restrict the amount and type of television their child watches, compared to 58 percent and 69 percent respectively who restrict both at least once a week. Sixty percent of parents regularly placed restrictions based on their child's completing his or her homework, compared to 20 percent who never do. Finally, 74 percent of parents required chores to be completed regularly around the house compared to five percent who said they did not require their child to complete chores.

All parents were asked whether their children had access to the World Wide Web or to e-mail. Fifty-five percent of parents reported that their child had access to the World Wide Web or used e-mail. Of these, 41 percent of the children spent less than one hour a week in these pursuits, while 26 percent spent around an hour. Eighteen percent of parents reported their child spends 2 hours a week, with the remaining 16 percent responded their child spends three or more hours using the World Wide Web or e-mail. Of the percentage who responded that their child had access to the World Wide Web or e-mail, 89% said that they place restrictions on that access. Figure 10 details these parental responses.

Figure 10. Parental Restrictions on Child's Activities and Child's Access to Internet



***% of those with Internet access**

The survey asked parents about where their children spend their time in the summer when they would have normally been in school. When asked, "During a typical week last summer, where did your child usually go during the hours he or she would have been in school?" 47 percent responded that their child remained at home. Twenty-seven percent responded that their children were enrolled in structured day care programs, 15 percent said their children were placed in someone else's home, and the rest (11 percent) responded with family outings/trips, combinations of home and day programs, and summer school. Of the 27 percent who said their children were enrolled in structured day programs 37 percent of the children were enrolled in profit-based day cares or camps, 31 percent were enrolled in school-based summer programs, 20 percent were enrolled in non-profit day cares, and 11 percent attended religious or church-based programs. Of the 15 percent who reported that their child spent the summer in someone else's home, 82 percent of these were in a relative's home, and 17 percent went to a paid sitter's home or neighbor's home.

Parental Educational Expectations for Children

As with previous years, we asked parents their expectations of their children's overall educational attainment. Parents were still optimistic about their child's education. Mirroring past parent surveys, parents used a rating scale ranging from not finishing high school to completing an advanced professional degree. An overwhelming majority (90 percent, up from 79 percent last year) of parents surveyed believe that their children will complete at least a bachelor's degree, if not more education. The remaining ten percent believe their child will achieve at least a high school diploma, if not some college.

Parent-Teacher Interactions and Community/Neighborhood Perceptions

This year we were interested in the perceptions that parents hold about their relationship with their children's teachers and the school community. We were also interested in how such attitudes relate to whether or not their child attends a neighborhood school. Overall, most surveyed parents (86 percent) considered their child to attend a neighborhood school.

Parent-Teacher Interactions

Parents were asked how often in the past year they were requested by their child's teacher to sign off on her or his homework. Only eight percent responded "never" compared to 74 percent who reported "often." Similarly, 93 percent reported that they had attended two or more parent-teacher conferences

and 94 percent said that they regularly communicated with their child's teacher. Ninety percent agreed or strongly agreed that they had received positive phone call or notes from their child's teacher about improvement in his or her performance. We also asked parents about their child's teachers. Eighty-eight percent agreed or strongly agreed that their own values were similar to their child's teachers. Even so, parents also reported (92 percent agreed or strongly agreed) that they felt free to disagree with their child's teachers. Differences were not found between parents who consider their child to be attending a neighborhood school and parents who did not consider their child to be attending a neighborhood school.

Parent-School Interactions

We asked parents general questions about their child's school and perceptions of their relationship with the school. Ninety-four percent of parents agreed or strongly agreed that they have opportunities to volunteer at their child's school and ninety percent of parents felt that parent teacher organizations substantially contribute to the wellbeing of their child's school. Eighty-four percent also disagreed or strongly disagreed that they had ever felt unwelcome at their child's school. Parents report that they work or would be willing to work for the betterment of their child's school. Ninety-six percent of parents strongly agreed or agreed that they would be willing to work with other children's parents to improve their child's school while ninety-three percent say that they contribute extra material items to their child's classroom. Responses to the questions about volunteering and contributing extra material to their child's classroom did differ slightly (though significantly) between those parents who consider their child to be attending a neighborhood school (34 percent strongly agree that they have opportunities to volunteer, 29 percent strongly agree that they contribute extra material to their child's classroom) and those who do not (28 percent strongly agree that they have opportunities to volunteer, 21 percent strongly agree that they contribute extra material to their child's classroom).

Most parents perceive their child's school to be in a safe neighborhood, though perceptions slightly differ (though significantly) between those who do and do not consider their children to attend a neighborhood school. For example, 29 percent of those who consider their child to attend a neighborhood school strongly agreed that the community in which the child's school is located is safe compared to 20 percent of those who do not consider their child to attend a neighborhood school. Similarly, those who consider their child's school to be a neighborhood school were more likely to strongly agree (24 percent) that their school benefits from community sponsors than those who do not consider their child's school to be a neighborhood school (16 percent). Overall, parents reported a good relationship with their children's schools and the communities in which the schools are located.

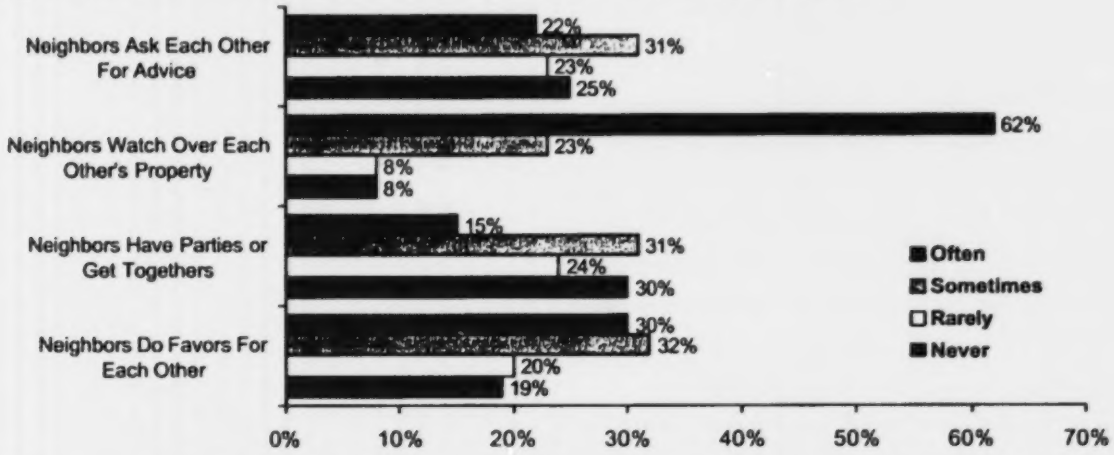
Interactions with other Parents

We asked parents to respond to several questions about their perceptions of parent interactions and involvement at their children's schools. Seventy-five percent of parents agreed or strongly agreed that parents of other children can be trusted, 93 percent of the respondents felt that there are other parents in their child's school who other children can look up to. Again 93 percent of parents said they know their children's school friends, while 82 percent know their children's school friends' parents. Parents were divided in their responses to whether they would ask other children's parents for advice and whether they borrowed things or exchanged favors with other parents. 44 percent of respondents agree or strongly agree that they borrow things and exchange favors, while 45 percent disagreed or strongly disagreed. Sixty-seven percent of respondents said they ask other parents for advice, while 25 percent said they do not. Differences were not found on these items between those parents who consider their child to attend a neighborhood school and those who do not.

Neighborhood Questions

Finally, we asked parents about their perceptions of their neighborhoods and relationships with neighbors. Sixty-two percent of parents reported that they and other neighbors often watch over each other's property (23 percent responded sometimes, 8 percent responded both rarely and never). Responses were more evenly divided when asked if people in their neighborhood do favors for each other (30 percent often, 32 percent sometimes, 20 percent rarely and 19 percent never), have parties or get togethers (15 percent often, 31 percent sometimes, 24 percent rarely and 30 percent never), and ask each other's advice (22 percent often, 31 percent sometimes, 23 percent rarely and 25 percent never). Figure 11 details parental responses to these items.

Figure 11. Parental Responses to Neighborhood Interactions (Percentages)



Differences on some of these items were found between those who consider their child to be attending a neighborhood school and those who do not. For example, 31 percent of parents who consider their child to attend a neighborhood school (compared to 22 percent of parents who do not consider their child to attend a neighborhood school) say they and their neighbors often do favors for each other. Conversely, 26 percent of parents who responded that their child's school is not a neighborhood school said they and their neighbors never do favors for each other, compared to only 18 percent of parents who responded that their child's school is a neighborhood school. Similarly, parents who consider their child's school to be a neighborhood school were more likely to respond affirmatively that they and their neighbors ask each other advice (24 percent respond often, 31 percent respond sometimes) than parents who do not consider their child's school to be a neighborhood school (13 percent responded often, 26 percent responded sometimes). Though percentages for both are higher than the other items, parents who responded that their child attends a neighborhood school were more likely to say that they and their neighbors watch over each other's property (63 percent) than parents who responded that their child does not attend a neighborhood school.

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5. Conclusions

It is important to realize that two limitations affect the interpretations of and responses to this study. First, the outcome measures presented in the report were constructed from teacher assessments of the students. These measures, while important, are not likely to be as reliable as standardized test scores that will be available for most of these students during the 2000-2001 school year and the promotion data at the time these students should be completing third grade. Second, the results may change over time. While this may occur as a result of the students' experiences in elementary school and at home, some effects that have been found to be significant at the end of second grade may change as the children progress in their schooling. Other effects that are not significant at this time may become significant.

In their third year of elementary school, students' registered significant gains in all academic skills and in communication skills. From the beginning of the school year until the end, gains were largest in math, science, and language arts. Social behaviors showed no overall improvement during the 1999-2000 year, but the very important attributes for future success, attitudes toward learning and asserting independence, did increase. While the average gains were modest for many skills and behaviors, underneath these averages are groups of students who appear to be on different trajectories, some making gains and others not.

The difference in trajectories caused performance gaps to increase by the end of the school year. For instance, students who received Special Instructional Assistance (SIA) fell further behind their peers, indicating that those services were not effective in reducing the pre-existing academic disparities between students. By the end of the year, family income emerged as a significant factor in explaining differences in performance, with students from families with lower incomes performing significantly lower on academic and social skill measures. Very small differences in four year-olds have become large differences four years later. It is impossible to tell whether these differences could be reduced by changes, such as more qualified teachers in Pre-K, or whether they will require changing early elementary instruction. Changes in both have begun as a result of the Governor's reform package adopted in 2000 by the General Assembly and as a result of OSR administrators' actions to raise the standards of qualification for Pre-K teachers. It is important to begin to assess these changes with a new cohort of Pre-K students.

Other changes in Pre-K policies may also need to be considered. Students at the older end of the cohort significantly out-performed their younger peers. To be eligible for Pre-K, students must be 4 years old by September 1 of the year that they attend Pre-K. Students very close to the age limit are about 10 percent behind their peers in math, for example. The differences are greater for children who are more likely to be disadvantaged. These results suggest that it may be reasonable to consider granting waivers for children who were born after June and whose parents wish to delay Pre-K services until the following year. These waivers may allow parents to make better choices for their children in the face of strong economic and social pressures to get them into Pre-K as early as possible. If the waivers are granted, cost-benefit studies could determine if they saved money in the long run by avoiding repeating grades and more costly special education assignments.

The effectiveness of Pre-K teachers who hold Child Development Associate (CDA) credentials declines as their years of experience increases. The effectiveness of teachers with college degrees, but who are not certified, also declines with more experience, but not as severely as those with CDAs. In their first few years of teaching, certified teachers are not as effective as the others, on average, but their effectiveness increases or remains constant as they gain experience. The process requiring that all Pre-K teachers have a college degree in a related field has already begun and the initiative received continued support in the analysis of effects through the study's fourth year. In-service training may also need to be expanded to avoid the loss of effectiveness with more experience. It is unclear whether certified teachers have the background to put their knowledge to better use as their experience accumulates or whether their in-service training is more effectively put into practice. Much can be

learned about effective professional development that would contribute to more effective in-service training by reading recent studies that evaluate the impacts of different types of professional development.

Overall, students of teachers who believe in and practice child-centered methods of instruction outperformed others during Pre-K and kindergarten. Their effectiveness in classes with more disadvantaged students is significant and persists through the students' fourth year of school. Teachers who taught these students during 1999-2000 are more directive in their approaches than Pre-K and kindergarten teachers, but not much different from last year's teachers. More analysis has been planned to examine how teachers' beliefs and practices, curriculum fidelity, and teachers' training impact their students' outcomes.

Parents are very pleased with their children's schools and teachers as indicated by 69 percent giving their child's school an "A." Much more analysis is needed to determine the influence of the parents' interactions with their children, of their interactions with other parents and teachers, and of the location of the school inside or outside their neighborhood on children's success in school. Transitions from Pre-K to kindergarten within the same school do relate to children's outcomes, but surprisingly not for children in Pre-K sites where disadvantaged students are concentrated. After test scores and promotion data are available, these issues should be probed in greater depth.

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Appendix A:

Sampling and Tracking

At the beginning of each year we make strenuous efforts to locate and follow children participating in the study. This process entails contacting school district superintendents, school principals, teachers, and children's parents. Each year we may lose certain students from the study (moving out of state, home schooling, etc.) but may also relocate students who we were unable to locate the previous year or who may have moved back into the state. An effort is made to account for all students in the original sample of children in the Pre-K year.

Another part of our sampling and tracking procedure each year has been to ensure that our current sample remains demographically similar to the original sample. If we find that we are more likely to lose a certain demographic characteristic (such as region) future analyses may be biased. Therefore, we compare demographics of our current sample with the original sample.

The following section details:

1. the initial sampling in the first year of the study;
2. the process of locating and tracking students in the current year of the study; and
3. the comparison of demographic characteristics between the sample of students in each year (Pre-K, kindergarten, first grade and second grade).

1. Initial Sampling in First Year of Study

In the first year (1996-1997) of this longitudinal study of the lottery-funded Georgia Prekindergarten (Pre-K) Program, a sample of 220 Pre-K classes was randomly selected from a total of 3,037 possible Pre-K classes across Georgia. The sample of 220 classes was stratified by three variables: region of the state, organization type, and curriculum. The state was divided into five regions: (1) North Georgia, (2) Metro Atlanta, (3) Southwest Georgia, (4) Southeast Georgia, and (5) South Georgia (See Figure A1). Organization types included the following: (1) local, or public school systems and (2) private school entities. Finally, for sampling purposes, the following curricula were included: (1) Creative, (2) High/Scope, (3) Montessori, (4) locally developed, and (5) "no information," for classes where there was no available curriculum information on the initial database. The "no information" classes were later assigned one of the four curricula when that information was available.

As a result of the first year of data collection, the initial sample size was reduced to 207 classes and 4,189 students. Thirteen classes were removed from the study due to lack of cooperation with data collection procedures from the Pre-K year or in gaining access to information needed to follow-up with the children in 1997-98.

Another decision was made to exclude students from the study if they did not complete a full year of Pre-K. A few rules were established in order to make this decision. A child was **included** in our study if he or she met one of the following criteria:

1. The child was rated by a Pre-K teacher at both the beginning and the end of the school year;
2. The child was rated by a Pre-K teacher at the end of the year, and the entire class was missing beginning of the year ratings;
3. The child was rated by a Pre-K teacher at the beginning of the year, and the entire class was missing end of the year ratings;

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4. The child was not rated at the beginning *or* the end of the Pre-K year, but the child was listed on an Office of School Readiness roster submitted in fall 1996, *plus* we received some piece of information at the end of the year confirming the child's enrollment (i.e., parent phone numbers submitted at the end of the year, attendance sheets received from the site, and/or parent telephone surveys that confirmed the child's full-year enrollment).

After removing children who did not meet any of the above criteria, there were 3,692 students remaining in the study at the end of the Pre-K year. Further review and scrutiny during the past year revealed an additional four Pre-K classes that were dropped from the original sample. These were classes where the data about services received by the students were suspect (for example, teachers or students in different classrooms at different times during the year). Therefore, the study is comprised of 3,639 students from 203 Pre-K classes.

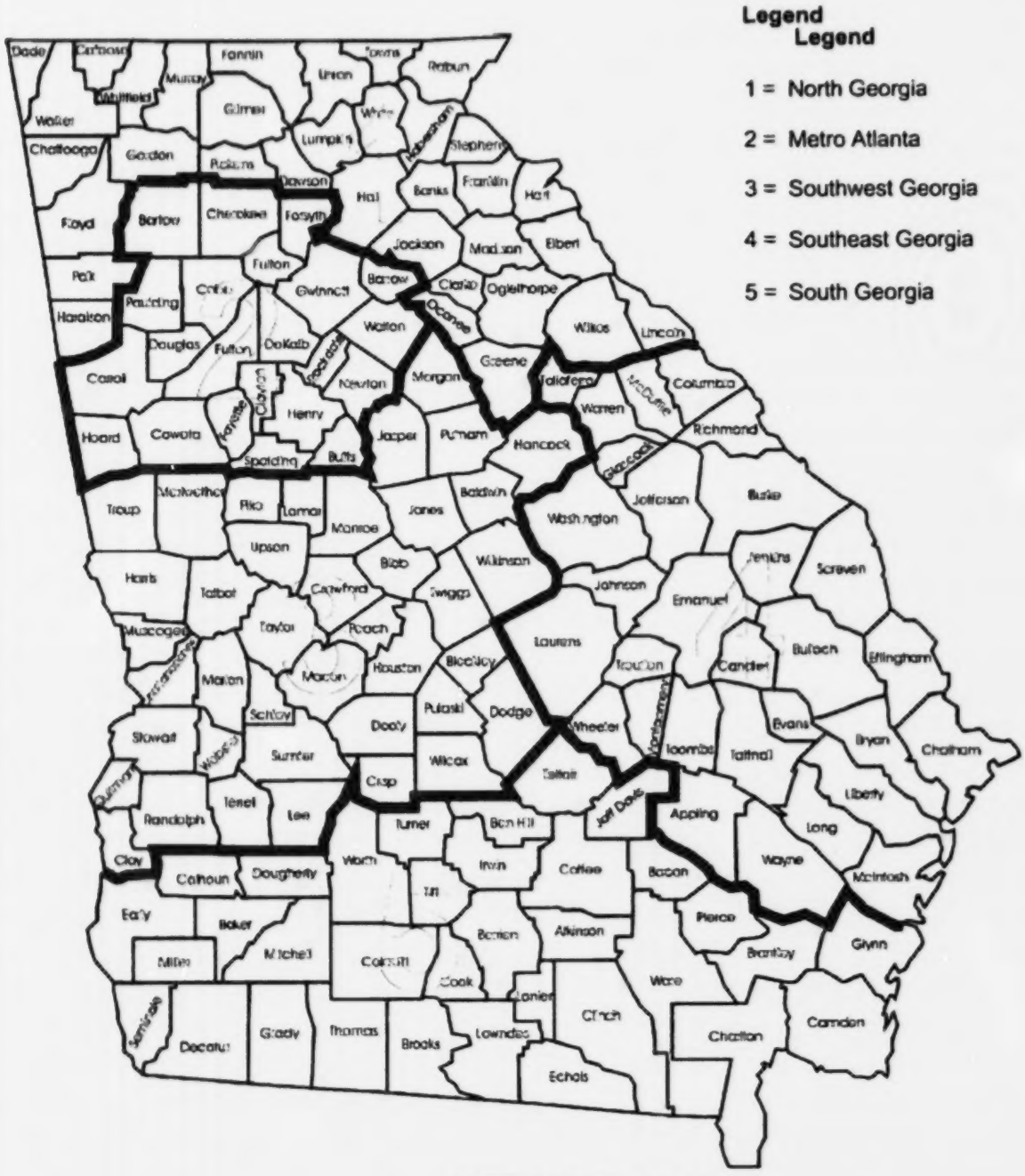
2. *Locating/Tracking Study Students in the Current Year*

Data collection efforts during fall 1999 for the fourth year of the study began by trying to locate students in their second-grade schools and classes (or alternative assignments). Efforts focused on information received in the previous year from principals, teachers, and parents as to where they expected children to attend school in 1999-2000. As a final attempt, a list of children's names and social security numbers was forwarded to the Georgia Department of Education requesting that student names be matched with enrollment data so that a school could be identified.

Once children were associated with a particular school, whether public or private, a list with those children's names was mailed to the principal of the elementary school. Along with the request to confirm the child's enrollment, the principal also was asked to identify the name of the first grade (or current) teacher for the child. Social security numbers were included with all children's names so that the correct child was referenced. After receiving confirmation that a child was enrolled in a specific classroom, the appropriate surveys were mailed to the student's current teachers.

The 3,639 children who were included in the sample of 203 prekindergarten classrooms in the first year of the study translated into 3,088 students in 1,657 classrooms in the second year of the study. In the third year of the study a total of 3,018 students were located in 1,847 classrooms. Finally, in the fourth year of the study we located 2,982 students in 1,978 Georgia classrooms. This number does include students who were not located in the second year because we included the entire Pre-K sample when we began the locating process in the fourth year. The number (2,982) does not, however, include children who were located but either moved out of Georgia, died, or participated in home schooling for the fourth year in our study.

Figure A1: Counties within Metro Atlanta area contrasted with the rest of Georgia.



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3. *Comparison of Student Demographic Characteristics between Samples*

As mentioned earlier, we wanted to ensure that the sample of 2,982 students who were located in the fourth year of the study was similar to the original sample. For example, if 50 percent of the original sample was comprised of females, then 50 percent of the current sample should be comprised of females. Therefore, at the end of the fourth year we compared the demographics of students for whom we had valid rating forms at the beginning of the Pre-K year with the demographics of students for whom we had valid rating forms at the end of Pre-K, kindergarten, first-grade and second-grade years (see Table A1 for Pre-K attrition bias). Though we expected to lose children from the original sample (moving, home schooling) we wanted to be confident that our current sample (2,982) was demographically similar to the original sample (3,639).

Table A1: Pre-K Attrition Bias

Variable	Pre-K Beginning		Pre-K End		Kindergarten End		1st Grade End		2nd Grade End	
Number of Students with Valid Ratings	3490		3061		2201		2267		2407	
Region	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%
No. Georgia	486	13.9	450	14.7	344	15.6	330	14.6	355	14.7
Metro Atl.	1669	47.8	1382	45.1	938	42.6	1016	44.8	1071	44.5
SW Georgia	480	13.8	431	14.1	371	16.9	375	16.5	377	15.7
SE Georgia	520	14.9	502	16.4	331	15.0	348	15.4	359	14.9
So. Georgia	335	9.6	296	9.7	217	9.9	198	8.7	245	10.2
Missing	0	–	0	–	0	–	0	–	0	–
Organization Type	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%
Public (LSS)	1435	41.1	1346	44.0	1068	48.5	1027	45.3	1107	46.0
Not for Profit*	348	10.0	268	8.8	216	9.8	229	10.1	210	8.7
Private for Profit	1707	48.9	1447	47.3	917	41.7	1011	44.6	1090	45.3
Missing	0	–	0	–	0	–	0	–	0	–
Curriculum	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%
High Scope	2350	67.3	2094	68.4	1545	70.2	1565	69.0	1659	68.9
Creative	439	12.6	319	10.4	284	12.9	280	12.4	302	12.5
Locally Dev.	595	17.0	542	17.7	316	14.4	361	15.9	384	16.0
Other	106	3.0	106	3.5	56	2.5	61	2.7	62	2.6
Race	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%
White	1632	52.8	1464	53.1	1179	53.9	1191	52.8	1304	54.4
Black	1167	37.8	1030	37.4	819	37.4	839	37.2	875	36.5
Other	290	9.4	262	9.5	189	8.6	226	10.0	217	9.1
Missing	401	–	305	–	14	–	11	–	11	–
Sex	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%
Male	1578	50.8	1399	50.5	1099	50.0	1158	51.1	1184	49.2
Female	1527	49.2	1372	49.5	1098	50.0	1109	48.9	1222	50.8
Missing	385		290		4	–			1	–
Category 1	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%
Yes	1598	51.6	1389	50.8	1046	52.3	1059	51.1	1136	51.8
No	1501	48.4	1345	49.2	954	47.7	1015	48.9	1055	48.2
Missing	391	–	327	–	201	–	193	–	216	
Average School SES	2.981		2.99		2.947		2.991		2.970	

**Not-for-Profit sites include Government Not-for-Profit, Private Not-for-Profit, and Headstart*

Characteristics of many of the demographics are similar for all four rating periods. For example, at the beginning of the Pre-K year, 53 percent of the sample was white, 38 percent was black, and 9 percent was other while at the end of the second-grade year 54 percent was white, 37 percent was black and 9 percent was other. The percentages of males and females did change between Pre-K year (49 percent female, 51 percent male) to second-grade year (51 percent female, 49 percent male). Finally, whereas 51.4 percent of the sample was children whose families qualified for category one services during the Pre-K year, 52 percent of the sample in second grade was children whose families qualified for category one services during the child's Pre-K year.

The percentage of children in the Metro Atlanta region decreased somewhat (from 48 percent in the Pre-K year to 45 percent at the end of the second-grade year), while the percentage of children from southwest Georgia and southeast Georgia increased (from 14 percent and 15 percent respectively in the Pre-K year to 16 percent and 15 percent respectively at the end of the first-grade year). Similarly, the percentage of children who were instructed with a high scope curriculum in Pre-K year increased between beginning of Pre-K and end of second grade (from 67 percent to 69 percent), while the percentage of children instructed with a locally developed curriculum decreased (from 17 percent to 16 percent).

One area where the original sample differed from the current sample was organization or school type. Even though the majority of the current sample attended public school during the 1999-2000 school year, many of these children had originally attended a private Pre-K. Therefore, we increased our efforts to find children who had attended a private-for-profit Pre-K but who moved to a public kindergarten or public elementary school. At the beginning of the Pre-K year, 49 percent of children for whom we had a valid rating form attended a private-for-profit Pre-K. In the kindergarten sample, 42 percent of children for whom we had a valid rating form attended a private-for-profit Pre-K. However, by the end of the second-grade year that percentage had increased to 45 percent.

Though some small differences did exist, we were able to conclude that significant demographic differences do not exist between our original Pre-K sample and the current sample.

Appendix B:

Teacher Characteristics for Each of the Four Successive Teacher Samples

During each of the four years of the longitudinal evaluation of the Georgia Prekindergarten Program, teachers of the children in the evaluation sample completed a survey that measured a number of teacher characteristics. Such characteristics include teacher race, level of education, teaching style, number of students enrolled in the classroom, teaching certification type, and years of experience. Table B1 presents frequencies of each teacher characteristic for the four successive samples. Table B1 reports that the proportion of teachers who teach in each of the five geographical regions of Georgia (North Georgia, Metro Atlanta, Southwest Georgia, Southeast Georgia, and South Georgia) has remained relatively consistent across each of the four successive teacher samples. However, a number of teacher characteristics vary considerably across the four samples. For most of the teacher characteristics, significant differences exist between Year 1 teachers, Year 2 teachers, and teachers during Year 3 of the study (mostly first-grade teachers). However, for each of the teacher characteristics, teachers from Year 3 of the study were similar to teachers from the current year of the study (Year 4).

About two-thirds (68.4 percent) of the Year 1 teacher sample is white. The proportion of teachers in the Year 3 sample and Year 4 sample who are white was considerably higher (83.0 percent and 81.9 percent, respectively). Race of teachers was not measured during the second year of the study. The level of education among Year 1 teachers was lower than each of the three subsequent teacher samples. The proportion of teachers who reported having less than a college degree, a college degree, and an advanced degree was similar for teachers during the second, third, and fourth years of the study.

A teacher's theoretical approach to educating young children was characterized either as adult-directed; middle-of-the-road; child-centered; more directive, highly conflicted; or middle-of-the-road, conflicted. A comparison of teaching styles across each of the four teacher samples is presented in the main body of the report, specifically in the Classroom and Teacher Characteristics section.

The average number of students in each teacher's classroom during the current year of the study is about 21. About 21 students were enrolled in classrooms during Year 2 and Year 3 of the study; however, on average, fewer than 18 students were enrolled in Year 1 classes. The type of teaching certification varies across each of the four samples. Year 1 teachers have different certification types than teachers of older students. As students progressed through the second, third, and fourth years of the study, teachers were less likely to possess early childhood education certification (valid for Pre-K through 5th grade). Teachers from Year 3 and Year 4 of the study were more likely than Year 2 teachers to have an elementary education certification type (valid for Pre-K through 8th grade). The proportion of teachers who reported having both certification types (early childhood education and elementary education) was highest among the sample of teachers from the current year of the evaluation.

Year 1 teachers reported having the least amount of experience teaching their current grade-level than teachers in the three subsequent samples. Teachers from the current year of the study (Year 4) reported similar amounts of teaching experience as teachers during Year 3 of the study. However, these two teacher samples, overall, had less experience than Year 2 teachers.

Table B1: Teacher Characteristics for Each of the Four Successive Teacher Samples

Teacher Characteristic	Year 1 (n=203)		Year 2 (n=1649)		Year 3 (n=1838)		Year 4 (n=2000)	
Region:	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%
North Georgia	26	12.9	235	14.3	232	12.6	283	14.2
Metro Atlanta	97	48.0	802	48.7	926	50.4	1000	50.2
Southwest Georgia	30	14.9	236	14.3	271	14.7	275	13.8
Southeast Georgia	30	14.9	229	13.9	257	14.0	273	13.7
South Georgia	19	9.4	146	8.9	152	8.3	163	8.2
Missing	1	–	1	–	0	–	6	–
Race:	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%
White	119	68.4			1009	83.0	1144	81.9
Black	46	26.4			192	15.8	233	16.7
Other	9	5.2			14	1.2	19	1.4
Missing	29	–			623	–	604	–
Education:	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%
Less than College Degree	26	14.9	2	.4	1	.1	1	.1
College Degree	130	74.7	234	46.3	637	52.1	670	47.3
Advanced Degree (Master's Degree, Six-year Specialist, Doctoral)	18	10.3	269	53.3	585	47.8	746	52.6
Missing	29	–	1144*	–	615	–	583	–
Teaching Style:	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%
Adult-directed	11	6.1	304	24.9	432	32.3	476	34.0
Middle-of-the-road	40	22.3	437	35.7	430	32.2	495	35.3
Child-centered	87	48.6	187	15.3	113	8.5	74	5.3
More directive, highly conflicted	1	.6	36	2.9	80	6.0	96	6.8
Middle-of-the-road, conflicted	40	22.3	259	21.2	282	21.1	261	18.6
Missing	24	–	426	–	501	–	598	–
Number of students:	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%
Fewer than 17	41	20.3	41	8.2	95	7.9	154	10.9
17-20	159	78.7	131	26.1	355	29.5	425	30.0
21 and above	2	1.0	329	65.7	753	62.6	836	59.1
Missing	1	–	1148*	–	635	–	585	–
	Mean=17.9		Mean=21.7		Mean=~21.0		Mean=20.77	

Certification type	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%
CDA or CCP	17	10.2	0	0	0	0	0	0
Montessori or Vocational	15	9.0	0	0	0	0	0	0
Degreed	3	1.8	0	0	0	0	0	0
Certified	129	77.2	0	0	0	0	0	0
Insufficient	3	1.8	0	0	0	0	0	0
Early Childhood Ed. (P-5)	0	0	384	70.7	808	66.9	778	55.1
Elementary Ed. (P-8)			44	8.1	298	24.7	304	21.5
Both Early Childhood Ed. and Elementary Ed.	0	0	52	9.6	102	8.4	294	20.8
Other	0	0	63	11.6	0	0.0	37	2.6
Missing	36	–	1106*	–	630	–	587	–
Years of Experience Teaching Current Grade-level	Number	Valid%	Number	Valid%	Number	Valid%	Number	Valid%
1-2 Years	83	48.5	89	17.7	332	27.6	378	26.8
3-5 Years	46	26.9	106	21.1	302	25.1	376	26.6
6-10 Years	34	19.9	118	23.4	215	17.9	276	19.6
More than 10 Years	8	4.7	190	37.8	354	29.4	381	27.0
Missing	31	–	1146*	–	635	–	589	–

*Information about teachers' race was not collected for kindergarten teachers.

**The large number of missing cases among kindergarten teachers for teacher education, number of students enrolled in the class, certification type, and years of experience results from selecting a sub-sample of teachers to participate in the kindergarten teacher survey.

Table B2 compares the cluster memberships of Pre-K teachers, kindergarten teachers, and first-grade teachers for a 3-cluster solution and a 5-cluster solution. In general, there is a strong relationship between cluster assignments for the two clustering procedures. However, the 3-cluster solution was computed separately for each of the three teacher samples, while the 5-cluster solution was computed simultaneously for each of the teacher samples. Much of the difference in the assignment of cluster memberships between the 3-cluster solution and the 5-cluster solution relates to this method of clustering all of the teachers simultaneously rather than conducting a separate analysis for each sample. For example, nearly three-fourths (72.3 percent) of Pre-K teachers who were assigned to the adult-directed cluster using the 3-cluster solution were assigned to the middle-of-the-road cluster in the 5-cluster analysis. Thus, teachers who were adult-directed relative to the rest of the Pre-K sample are mostly characterized as middle-of-the-road relative to the entire sample of teachers. Teachers who were assigned to the two clusters in the 5-cluster solution that are characterized by high discrepancies between beliefs and practices, were most often assigned to the middle-of-the-road cluster in the 3-cluster solution.

Table B2: Comparison of Teachers' Cluster Memberships for a 3-Cluster Solution and a 5-Cluster Solution of Teaching Styles

Pre-K Teachers during Year 1 (n=176)

	3 Cluster Solution					
5 Cluster Solution	Adult-directed (n=47)		Middle-of-the-road (n=43)		Child-centered (n=86)	
	N	%	N	%	N	%
Adult-directed	8	17.0	2	4.7	0	0
Middle-of-the-road	34	72.3	0	0	6	7.0
Child-centered	5	10.6	7	16.3	73	84.8
More Directive, Highly Conflicted	0	0	1	2.3	0	0
Middle-of-the-road, Conflicted	0	0	33	76.7	7	8.1

Kindergarten Teachers during Year 2 (n=1100)

	3 Cluster Solution					
5 Cluster Solution	Adult-directed (n=221)		Middle-of-the-road (n=417)		Child-centered (n=462)	
Adult-directed	N	%	N	%	N	%
Middle-of-the-road	208	94.1	66	15.8	0	0
Child-centered	0	0	236	56.6	158	34.2
More Directive, Highly Conflicted	0	0	0	0	166	35.9
Middle-of-the-road, Conflicted	4	1.8	11	2.6	20	4.3
	9	4.1	104	24.9	118	25.5

First-grade teachers during Year 3 (n=1203)

	3 Cluster Solution					
5 Cluster Solution	Adult-directed (n=467)		Middle-of-the-road (n=513)		Child-centered (n=223)	
Adult-directed	N	%	N	%	N	%
Middle-of-the-road	388	83.1	6	1.2	0	0
Child-centered	16	3.4	297	57.9	71	31.8
More Directive, Highly Conflicted	0	0	0	0	95	42.6
Middle-of-the-road, conflicted	16	3.4	57	11.1	3	1.3
	47	10.1	153	29.8	54	24.2

Appendix C

Description of the Statistical Methods Used In The Fourth-Year Report

The purpose of this Appendix is to describe the methods used to estimate the influence that differences in teachers' characteristics, classroom characteristics, family background and individual differences in children's skills and abilities before entering Pre-K have on their second-grade outcomes.

The results presented in Tables 6-10 in the main body of the third-year report were estimated using a structural equation modeling (SEM) approach. SEM provides an estimate of the strength of the expected relationships between variables in a model. In the spring and fall, teachers were asked to rate each student in the study on 24 criteria. The rating scale ranged from 1 (extraordinarily poor) to 7 (extraordinarily good). These ratings were constructed to measure various aspects of the children's performance during the school year, including academic skills and abilities, social behaviors, communication skills, and readiness. Based on prior research, we expected that family background characteristics, teachers' beliefs and instructional practices, teachers' qualifications, classroom characteristics, and previous measures of the children's skills and abilities would impact second-grade ratings.

The variables that were combined to form the students' outcomes discussed in this report are found in Table A-1. Headings for each section of the table represent the outcomes variables. The variables listed under the Pre-K heading were used as independent or predictor variables to explain differences in the fourth-year outcomes in this report. The variables listed in the kindergarten section were used as entry scores in the analyses of the impact of kindergarten on fourth year outcomes. The constructs are called latent variables in that they are unobserved variables. Latent variables represent some unobservable underlying construct that cannot be directly measured, but is believed to exist. Latent variables are constructed by combining measured variables that are found statistically to have a strong common component. A benefit of the SEM approach is that it offers the most powerful ways to incorporate both observed and latent variables.

As an example of latent variables and the use of SEM, during the Pre-K year, teachers were asked to rate students' language arts abilities on a seven-point scale. This observed variable represented the teachers' beliefs about the development of the child's language arts abilities. However, starting with the first grade, teachers were asked to rate students on a more refined and differentiated set of language arts abilities, including various underlying attributes that make up language arts. Specifically, what we called language arts includes ratings on reading skills (beginning reading, developed reading), expression (vocabulary usage, speaking skills), writing and overall language arts. We hypothesized that these underlying attributes, closely tied to the Quality Core Curriculum, were closely related to one another. This example highlights the significant aspects of a latent variable; that it requires operational specificity, multiple observed variables and that the observed variables assess a common construct. One additional benefit of the latent model is that it specifies and accounts for the measurement error in the variables. Respondents may misunderstand a question or enter the incorrect code, which is estimated as part of the model.

The specific attributes that formed the underlying constructs used in this report are as follows:

Table C1. Variables Used to Form Latent Constructs

Pre-K				
Behavior	**Communication**	**Pre-Academic**		
Respect for Authority	Communication Skills	Overall Math		
Ethical Behavior	Making Conversation	Overall Language Arts		
Refusal Skills	Expressing Feelings			
Coping with Conflict				
Positive Attitude Toward Others				
Kindergarten				
Behavior	**Communication**	**Math**	**Language Arts**	
Respect for Authority	Making Conversation	Overall Math	Overall Language Arts	
Ethical Behavior	Expressing Feelings			
Refusal Skills	Communication Skills			
Coping with Conflict				
Positive Attitude Toward Others				
First Grade				
Behavior	**Communication**	**Math**	**Language Arts**	**Science**
Respect for Authority	Vocabulary Usage	Counting	Vocabulary Usage	Science
Ethical Behavior	Speaking Skills	Sequencing	Speaking Skills	
Refusal Skills	Communication Skills	Addition and Subtraction	Beginning Reading	
Coping with Conflict	Making Conversation	Overall Math	Developed Reading	
Positive Attitude Toward Others	Expressing Feelings		Overall Language Arts	
			Writing	
Second Grade				
Behavior	**Communication**	**Math**	**Language Arts**	**Science**
Respect for Authority	Listening	Addition and Subtraction	Writing	Science Process and Inquiry Skills
Ethical Behavior	Speaking Skills	Problem Solving	Grammar	Science Concepts
Refusal Skills	Making Conversation	Measurement	Listening	
Coping with Conflict	Expressing Feelings	Patterns	Speaking Skills	
Positive Attitude Toward Others		Shapes	Overall Language Arts	
		Overall Math		

SEM simultaneously estimates the latent variable part of the model described above, called the measurement model, as well as the better-known regression part, called the structural model. Each of the latent variables listed above, plus the single observed variable of "Third-Grade Readiness" were used as dependent variables in Tables 6-10. In the table below, we describe how these predictor variables were constructed. The model is estimated using a maximum likelihood estimator, which uses an iterative process to minimize the error terms in the model.

Table C2: Definition of the Independent Variables

Independent Variables	Discussion
Income	The income variable ranged from 1 (less than $10,000) to 10 (greater than $100,000).
Category 1	This is a Pre-K variable, where a 1 indicates that the child's family is eligible for food stamps, TANF, etc.
More Directive Teaching Style	This variable indicates whether the teachers' beliefs and practices are more directive rather than child-centered.
Conflicted Teaching Style	This variable indicates whether the teachers' have conflicting beliefs and practices. Usually, with more child-centered beliefs than practices
Race (Black = 1)	If the child is of African-American descent, this variable is coded 1. All others are coded 0.
Race (Other Non-White = 1)	If the child is neither African-American nor non-Hispanic White, this variable is 1. All others are coded 0.
Sex (Male = 1)	If the child is male, this variable is coded 1. All others are coded 0.
Parents' Education	The education variable ranged from 1 (less than high school diploma) to 6 (professional or graduate degree). We use the highest education in the household.
Parents' Marital Status (Married = 1)	If the parents are married and living together, this variable is coded 1. All others are coded 0.
Years of Pre-K Teacher Experience	The actual number of years teaching 4 year-olds is coded.
CDA	If the Pre-K teacher has a child development associate diploma, the variable is coded 1. All others are coded 0.
Certificate	If the Pre-K teacher is certified, the variable is coded 1. All others are coded 0.
Certified x Years of Teaching	The certification variable is multiplied by the years of teaching experience.
CDA x Years of Teaching	The CDA variable is multiplied by the years of teaching experience.
P-5 and P-8	We coded whether the teacher had either a P-5 or P-8 certificate. If the teacher had both, we coded a one for each certificate type. If a teacher did not have one of the aforementioned certificates, we coded the variable(s) with a 0.
Advanced Degree	If the teacher completed the requirements for an advanced degree, we coded this variable 1, otherwise the teacher received a 0.
# of Disruptive Children	The actual number of disruptive children, as reported by the Pre-K teacher, is coded.
Age of Child at Entry	This variable lists the actual age of the child to the second decimal point at the time that the Pre-K program started.
Transition within School	If the child was in the same school for the Pre-K and kindergarten years, we coded this variable 1. If the child changed school locations, this variable was coded 0.

Given the complexity of this longitudinal study, surveying teacher opinions, obtaining teacher ratings of students, and surveying parents' opinions, missing data results from inability to reach every one of these sources every time data is needed or in their refusal to cooperate from time to time. In some cases, teachers or parents were either unwilling or unable to respond, in other cases, teachers retired or parents moved. Additionally, in some cases, parents or teachers failed

to answer individual questions within the surveys and ratings. If the missing data is unrelated to the actual ratings of the child, that is, if teachers of low performing students are just as likely to fail to return rating forms of high-performing students, then the missing data is called *missing at random*. If the missing data is completely unrelated to any other variable in the data set, that is, if low income families and high income families both fail to respond to the income question with equal probability and unrelated to any other characteristic, then the data is *missing completely at random*. Our analysis of the data indicates that the former is more representative of the data collection.

The form of missing data has practical implications for the method of analyzing data. In the latter case, if the data is missing completely at random, one may ignore cases with missing information. This can be accomplished by removing these cases from the analysis entirely (listwise deletion). The entire record is omitted from consideration within the model. Other methods of handling the problem include imputing the missing data with the average from the entire sample. Data that is missing at random requires a specialized technique known as a full information maximum likelihood estimator (FIML). The FIML estimator uses all of the available information for each child and includes all available information in estimating the results. The averages from the observed variables, as well as their range and their relationship to other observed variables all are used to contribute to the likelihood estimate.

Two methods to assess the validity of a SEM model is through an analysis of the fit indices and the percent of variance accounted for. One of the primary fit indices is the Root Mean Square Error of Approximation (RMSEA), which should be below .05 as an indication of adequate fit of the model to the data. This is an estimate of the error per degree of freedom. The RMSEA is listed in the fourth column in the table below, while the degree of freedom is denoted by the parenthesis in the second column. The chi-square, listed in the second column, is the basis for estimating the fit indices. The third column, entitled "R^2," is the estimate of how much of the variance is explained by the model. The figures can range from 0 to 1, with 1 representing a model that perfectly explains the dependent variable. R^2 values in social research generally range from .15 to .40.

Table C3. Fit Indices for Tables 7-12, C4-C9

	Language Arts	Math	Science	Readiness	Communications	Behavior
Fit Indices for Total Sample						
Prekindergarten - Prekindergarten						
χ^2 (df)	306.3 (30)	306.3 (30)		301.4 (30)	930.9 (166)	1237.6 (216)
RMSEA	.071	.071		.070	.050	.051
R^2	.341	.367		.337	.540	.538
Prekindergarten - Kindergarten						
χ^2 (df)	299.7 (30)	299.3 (30)		298.8 (30)	813.2 (166)	1343.9 (216)
RMSEA	.070	.070		.070	.046	.054
R^2	.206	.188		.227	.261	.278
Prekindergarten - First Grade						
χ^2 (df)	863.9 (148)	469.9 (84)	311.1 (30)	308.6 (30)	1188.1 (215)	991.7 (216)
RMSEA	.052	.050	.072	.071	.050	.044
R^2	.274	.203	.157	.240	.281	.182
Prekindergarten - Second Grade						
χ^2 (df)	716.9 (126)	1050.9 (126)	330.3 (47)	299.9 (30)	975.3 (190)	1042.4 (216)
RMSEA	.051	.063	.058	.070	.048	.046
R^2	.264	.252	.265	.233	.260	.255
Kindergarten - Kindergarten						
χ^2 (df)	230.3 (38)	233.7 (38)		231.2 (38)	721.4 (202)	1284.5 (260)
RMSEA	.053	.053		.053	.038	.047
R^2	.293	.264		.295	.231	.346
Kindergarten - First Grade						
χ^2 (df)	829.8 (180)	421.8 (104)	219.3 (38)	226.5 (38)	1015.1 (259)	926.7 (260)
RMSEA	.045	.041	.051	.052	.040	.038
R^2	.242	.215	.242	.230	.215	.236
Kindergarten – Second Grade						
χ^2 (df)	692.5 (154)	1002.5 (154)	269.0 (59)	232.2 (38)	892.4 (230)	958.0 (260)
RMSEA	.044	.055	.044	.053	.040	.038
R^2	.292	.257	.276	.247	.215	.336
Fit Indices for Low SES Sample						
Prekindergarten - Second Grade						
χ^2 (df)	863.3 (259)	1276.6 (260)	491.9 (98)	414.3 (64)	1329.9 (394)	1461.4 (447)
RMSEA	.052	.067	.066	.080	.052	.057
R^2	.295	.305	.298	.269	.286	.253
Kindergarten – Second Grade						
χ^2 (df)	886.1 (315)	1224.8 (316)	382.9 (122)	301.1 (79)	1323.3 (474)	1486.7 (535)
RMSEA	.046	.058	.050	.057	.046	.045
R^2	.302	.276	.273	.275	.286	.367

Analyses similar to Tables 7-12 were estimated for those in lower SES schools. Principals were asked to assess the occupational and educational background of the families of the children in target classrooms or schools, which we then converted into a quantitative assessment. The scale theoretically could range from 1 (parents are unskilled or low-skilled, no high school diploma) to 6 (parents are executives or professionals with graduate degrees), and in practice ranged from 1.10 to 5.30. The mean was 3.01 and the median was 2.90. We set the cut rate at 3.00, with 3.00 and above indicating higher SES and below 3.00 indicating lower SES.

Table C4 corresponds to Table 7, Table C5 corresponds to Table 8 and so on. The significant differences between these models are discussed below.

Table C4-9: Estimates of the Influences of Prekindergarten Characteristics on First-Grade Outcomes for Children in Lower SES Classrooms

Low SES Language Arts

	Gains from beginning of Prekindergarten year to	Gains from beginning of Kindergarten year to
Variables	End of 2nd Grade	End of 2nd Grade
Teacher Beliefs & Practices	.061**	.020
Teacher Years	-.116**	.020
CDA	-.275	
Certificate	-.586**	
Certificate * Yrs	.114**	
CDA * Yrs	.052	
ECE		.229
EE		.496
Other		.130
ECE * Years		-.004
EE * Years		-.021
Other * Years		.007
Adv. Degree		-.065
Disruptive Kids	-.054**	-.040
Age	.400**	.421**
Transition		.050
Education	.141**	.173**
Income	.078**	.115**
Category 1	.114	.020
Sex	-.339**	-.385**
Black	-.126	-.180**
Other Race	.098	.269*
Marital Status	.063	-.049
Communication		
Behavior		
Academic	.451**	.475**
Intercepts	2.053	1.370

* p < .10 ** p < .05

Table C5. Low SES Math Models

	Gains from beginning of Prekindergarten year to	Gains from beginning of Kindergarten year to
Variables	End of 2nd Grade	End of 2nd Grade
Teacher Beliefs & Practices	.053*	.026
Teacher Years	-.136**	.039
CDA	-.341	
Certificate	-.733**	
Certificate * Yrs	.132**	
CDA * Yrs	.055	
ECE		.323
EE		.768
Other		.294
ECE * Years		-.035
EE * Years		-.022
Other * Years		-.014
Adv. Degree		.050
Disruptive Kids	-.057**	-.013
Age	.517**	.530**
Transition		.061
Education	.133**	.165**
Income	.066**	.107**
Category 1	.092	-.005
Sex	-.023	-.111
Black	-.245**	-.324**
Other Race	.150	.313**
Marital Status	.086	.002
Communication		
Behavior		
Academic	.533**	.498**
Intercepts	2.450	1.274

* p < .10 ** p < .05

Table C6. Low SES Science Models

	Gains from beginning of Prekindergarten year to	Gains from beginning of Kindergarten year to
Variables	Pre-K - 2nd G	Kind - 2nd G
Teacher Beliefs & Practices	.037	.083
Teacher Years	-.129**	.043
CDA	-.282	
Certificate	-.505**	
Certificate * Yrs	.115**	
CDA * Yrs	.050	
ECE		.517
EE		.770
Other		.764
ECE * Years		-.045
EE * Years		-.015
Other * Years		-.062
Adv. Degree		-.016
Disruptive Kids	-.066**	-.040
Age	.493**	.477**
Transition		.075
Education	.163**	.193**
Income	.086**	.114**
Category 1	.114	-.019
Sex	-.087	-.168**
Black	-.257**	-.356**
Other Race	.244	.371**
Marital Status	.055	.004
Communication		
Behavior		
Academic	.529**	.489**
Intercepts	2.544**	1.235

* p < .10 ** p < .05

Table C7. Low SES Readiness Models

	Gains from beginning of Prekindergarten year to	Gains from beginning of Kindergarten year to
Variables	End of 2nd Grade	End of 2nd Grade
Teacher Beliefs & Practices	.049	-.031
Teacher Years	-.130**	.008
CDA	-.282	
Certificate	-.808**	
Certificate * Yrs	.130**	
CDA * Yrs	.015	
ECE		.005
EE		.061
Other		-.153
ECE * Years		.007
EE * Years		.027
Other * Years		.030
Adv. Degree		-.168
Disruptive Kids	-.099**	-.036
Age	.413**	.642**
Transition		.115
Education	.120**	.190**
Income	.084**	.136**
Category 1	.007	-.080
Sex	-.360**	-.390**
Black	-.145	-.173
Other Race	.140	.407**
Marital Status	.067	-.048
Communication		
Behavior		
Academic	.640**	.649**
Intercepts	3.341**	1.588

* p < .10 ** p < .05

Table C8. Low SES Communication Models

	Gains from beginning of Prekindergarten year to	Gains from beginning of Kindergarten year to
Variables	End of 2nd Grade	End of 2nd Grade
Teacher Beliefs & Practices	.051*	.004
Teacher Years	-.088**	-.030
CDA	-.143	
Certificate	-.530**	
Certificate * Yrs	.088**	
CDA * Yrs	.014	
ECE		-.254
EE		-.094
Other		-.548
ECE * Years		.046
EE * Years		.092
Other * Years		.064
Adv. Degree		-.173
Disruptive Kids	-.065**	-.007
Age	.355**	.373**
Transition		.064
Education	.153**	.206**
Income	.035	.066**
Category 1	.109	.038
Sex	-.354**	-.407**
Black	-.153*	-.181*
Other Race	.163	.339**
Marital Status	.172*	.097
Communication	.231*	-.237
Behavior	.038	.336**
Academic	.237**	.398**
Intercepts	3.142**	2.873**

* p < .10 ** p < .05

Table C9. Low SES Behavior Models

	Gains from beginning of Prekindergarten year to	Gains from beginning of Kindergarten year to
Variables	End of 2nd Grade	End of 2nd Grade
Teacher Beliefs & Practices	.036	-.013
Teacher Years	-.062**	-.048
CDA	-.402	
Certificate	-.464**	
Certificate * Yrs	.051**	
CDA * Yrs	-.043	
ECE		-.698
EE		-.652
Other		-.721
ECE * Years		.062*
EE * Years		.168**
Other * Years		.044
Adv. Degree		-.072
Disruptive Kids	-.038**	-.033
Age	.234*	.167
Transition		.092
Education	.184**	.170**
Income	.031	.025
Category 1	-.060	-.128
Sex	-.396**	-.412**
Black	-.084	-.088
Other Race	.379**	.524**
Marital Status	.212**	.233**
Communication	-.163	-.896**
Behavior	.418**	.933**
Academic	.145**	.514**
Int. Behavior	3.604**	4.429**

*** p < .10 ** p < .05**

Teachers' Beliefs and Practices

The beliefs and practices of teachers appear to have significantly greater influence on the outcomes in low SES classes. This is particularly true when considering Pre-K teachers. For most of the outcomes, the effects of more child-centered teachers in low SES schools are about twice that of the sample at large. The largest differences are in the behavioral model (.093 v. .043) and math (.061 v. .030) and smallest for communications (.051 v. .045). The analysis shows no significant effects of kindergarten teachers' beliefs and practices.

Child and Parent Demographics

Income appears to have significantly more impact upon outcomes within low SES schools. This is more so in the case of the kindergarten model. The biggest difference in the Pre-K model is for behaviors, where the effect of income rises from .012 to .063. That is, for every $10,000 of income, behavioral ratings are changed by about .05 points more in the low SES schools. For all of the other models, the change is greatest in the kindergarten models. The largest changes are in the readiness (.136 v. .072) and language arts ratings (.115 v. .055), and smallest for the communications model (.066 v. .029). The difference in the communications model is further mitigated by a significant decrease in the derogatory effects of being a Category 1 student. In the full sample, Category 1 students received ratings that were .14 below that of other students; in the low SES model, the coefficient is now slightly positive.

Black children appear to receive somewhat lower ratings in lower SES classes relative to white students from the same classes. Children of other races receive somewhat higher ratings. The math and science ratings for black children are about .10 points lower in low SES schools than black children as a whole. Children of other races in low SES schools received ratings that were

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.33 points higher, .28 points higher in communications, and about .15 points higher in the other outcome areas when compared to children of other races in the total sample. These results are generally limited only to the kindergarten model.

Parental education only plays a greater role in the social, behavior and communications ratings. In the behavioral model, the effects of a one-level change in parental education increased the second-grade outcome by .21 v. .13 in the full sample. This is only the case for the kindergarten model. In both the Pre-K and kindergarten models, the effects of parental education are higher in low SES schools. The effects increase from .106 to .184 and from .116 to .170 in the Pre-K and kindergarten models, respectively.

Teacher Qualifications

Consistent with previous research, teacher quality affects student outcomes more in lower SES classes than in the overall analysis including all classes. Using the language arts outcome as an example, once the effects of years of experience and the interaction between certified Pre-K teachers and years of experience are netted, there is little difference in the outcomes between students in low and high SES classes of certified teachers. However, students in classes with CDA certified teachers obtain outcomes .20 points lower in low SES classes.

Children's Age, Class Disruptions and Transition

Class disruptions in low SES schools have greater impact in the Pre-K models, but a lesser impact on the kindergarten models. For every outcome, the effect of kindergarten disruptions is weaker, in many cases far weaker, in low SES schools than for the total sample. For all models except behavior, the impacts of disruptive children in Pre-K double. The largest effect is in the readiness model, where, for every disruptive child, readiness scores of second graders are harmed by .099 versus .039 for the overall sample. Other outcomes generally show effects that are about .03 to .05 greater in low SES schools.

Age effects are quite large, particularly in terms of the models for the Pre-K year. The most drastic differences are in the Behavioral model, where a one-year difference in age produces outcomes that are .86 point higher. In the total model, the differences were only .16 point. In each of the other Pre-K models, except for readiness, the differences were significant, but not as dramatic. The changes were roughly in the .15 to .20 point range.

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